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PART 3.

TRANSACTIONS

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SOCIETY FOR BRITISH ENTOMOLOGY

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TRANSACTIONS OF THE SOCIETY FOR BRITISH ENTOMOLOGY

VOL. 9. 20TH SEPTEMBER, 1948. PART 3.

A CONTRIBUTION TOWARDS AN ECOLOGICAL SURVEY OF THE AQUATIC AND SEMI-AQUATIC HEMIPTERA-HETEROPTERA (WATER-BUGS) OF THE BRITISH ISLES; DEALING CHIEFLY WITH THE SCOTTISH HIGHLANDS, AND EAST AND SOUTH ENGLAND.

By E. S. BROWN, B.A., F.R.E.S.

INTRODUCTION.

This paper constitutes the third of a series of contributions to our knowledge of the ecology and distribution of British water-bugs, in a scheme proposed by Pearce and Walton (1939); the details of the method of the working of this scheme as given in that paper, the first of the series, were supplemented in a printed circular distributed privately to collectors by Walton (a number of which are still available on application to the present writer), and also in the second publication in the series (Brown, 1943).

Much of the data in the present paper comes from general collecting carried out previous to the inception of the recording scheme, and environmental details of habitats and other matters required by the scheme as proposed are not available in many cases; the records are, however, valuable in that they extend our knowledge of the Britannic distribution of the species, and it should be stressed that in many cases this knowledge is surprisingly incomplete. This last aspect is likely to be as important an outcome as any from these publications; collectors are asked to send any unpublished collecting records they may have for incorporation in later issues, even though habitat details are scanty; it will then be profitable later to publish a revised edition of the county distribution list given by Butler (1923), which is already largely out of date.*

In the matter of distribution, of particular interest in the

* Distribution records have been largely brought up to date by E. C. Bedwell (1945-46, *Ent. mon. Mag.* **81**: 253-273, **82**: 94-95) since this paper was first written.

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present issue are P. Harwood's records, since many of them are Scottish ones, and this is the district where the detailed distribution is least well known. Records of Scottish collecting will be particularly welcome for future issues. Butler (1923) mentions species as being present or absent in Scotland, without stating the counties; to trace the early records (mostly very old) is no easy matter, and new records are desirable. The writer will be pleased to identify any specimens collected in Scotland (or elsewhere for that matter), provided that details at least of the locality and vice-county can be furnished by the collector.

The arrangement of the paper is in the main that proposed by Walton in his printed circular, the sections being as follow:—

1. Key to the county symbols used.
2. Index to the contributors and their contributions.
3. List of species recorded.
4. List and descriptions of habitats and their loci.
5. Notes on ecology and distribution of species.

The nomenclature adopted is that given by China (1943), the only deviation from his arrangement being that *Corixa concinna* (Fieb.) is included in the subgenus *Vermicorixa* instead of in *Callicorixa*.

SECTION 1. KEY TO THE COUNTY SYMBOLS USED.

In subsequent sections habitats are referred to by vice-county symbols and numbers; for details of a habitat reference must be made to the appropriate two-letter symbol and number in Section 4. Symbols used in this contribution indicate counties or vice-counties as follows:—

Bedfordshire	BD.	Huntingdonshire	HU.
Berkshire	BK.	Inverness, East	EI.
Bucks	BX.	Kent, East	EK.
Cambridge	CB.	Kent, West	WK.
Cornwall, West	WC.	Norfolk, East	EN.
Denbighshire	DB.	Norfolk, West	WN.
Devon, South	SD.	Northants	NO.
Dorset	DT.	Oxfordshire	OX.
Dumfries	DF.	Perth, North	PN.
Elgin (Moray)	EL.	Ross, West	RW.
Essex, North	NE.	Somerset, South	SS.
Essex, South	SE.	Suffolk, West	WS.
Flint	FT.	Surrey	SR.
Gloucester, West	GW.	Sussex, East	EX.
Hants, North	NH.	Sussex, West	WX.
Hants, South	SH.	Wilts, South	SW.
Hertfordshire	HT.		

In Section 4 all counties and vice-counties, whether in England, Wales or Scotland, are arranged in alphabetical order of the names of the counties; this does not necessarily mean that the symbols are in alphabetical order.

SECTION 2. INDEX TO THE CONTRIBUTORS AND THEIR CONTRIBUTIONS.

Contributors to this paper are listed below; hereafter they will be referred to by their initials, as indicated in brackets.

Name	*Habitats visited.*
E. S. Brown (E.S.B.):	BD. 1-4, BX. 1-6, SE. 1-5, NH. 2-3, HT. 3-15, OX. 1-6, SR. 6, EX. 2, WX. 1-3.
P. Harwood (P.H.):	BK. 4-9, CB. 1-2, WC. 1, SD. 20-23, DT. 3-30, EL. 1-4, NE. 1-8, NH. 1, SH. 1, 21-43, EI. 1-28, EN. 1, PN. 1-4, RW. 1, SS. 1, WS. 1, SR. 4-5, EX. 1, SW. 5.
Dr. A. M. Massee (A.M.M.):	EK. 1, WK. 1.
H. G. Morgan (H.G.M.):	C.B. 3-21, SH. 44-45, WN. 1-3, SW. 8.
Rev. E. J. Pearce (E.J.P.):	DB. 1, FT. 1, RW. 2.
C. D. Routh (C.D.R.):	HU. 1-2, NO. 1-4.
H. D. Slack (H.D.S.):	DF. 1-4.
Dr. G. A. Walton (G.A.W.):	DT. 31-36, GW. 16, EN. 2-4, SW. 6-7.

The specimens collected by C.D.R. were identified by E.S.B., though the former is responsible for the descriptions of the habitats.

SECTION 3. LIST OF SPECIES RECORDED.

DIPSOCORIDAE.

Ceratocombus coleoptrata (Zett.). BK. 5, P.H.; N.E. 2, P.H.; SH. 24, P.H.

Pachycoleus rufescens J. Sahlb. DT. 7, P.H.; SH. 23, P.H.

Cryptostemma alienum H.-S. SH. 25, common, P.H.; PN. 1, locus 2, 7/21, common, P.H.

HYDROMETRIDAE.

Hydrometra stagnorum (Linn.). BK. 6, P.H.; CB. 16, 3/5/41, H.G.M.; DT. 16, P.H.; NE. 3, P.H.; SE. 2, 3/9/40, 1♀, E.S.B.; SE. 3, 5/8/40, 1♂, 2♀♀, 2 nymphs, E.S.B.; GW. 16, 21/8/40, many brachypt. spp., G.A.W.; SH. 26, P.H.; NO. 4, 27/8/40, 1♂, C.D.R.; OX. 4, 19/8/40, 2♂♂,

6 nymphs, E.S.B.; OX. 5, 20/8/40, a single nymph, E.S.B.; SR. 6, 8/9/40, 1 ♀, E.S.B.; SW. 7, 21/9/40, many spp. all brachypt., G.A.W.

Hydrometra gracilenta Horv. EN. 2, 6/8/38, 12♂♂, 11 ♀♀, all brachypt., G.A.W.

GERRIDAE.

Gerris (*Gerris*) *costae* (H.-S.). DF. 3, H.D.S.; EI. 9, 29/7/36, common, P.H.; EI. 11, 4/6/35 and 24/9/43, common, P.H.; EI. 12, 14/6/35 and 4/8/36, P.H.; PN. 3, 6/28 and 30/5/35, P.H.

Gerris (*Gerris*) *thoracicus* Schumm. SH. 36, P.H.; HT. 3, 4/4/40, 1, E.S.B.; HT. 5, 23/6/40, common, E.S.B.; HT. 13, 19/6/40, 1♂, E.S.B.; HT. 14, locus 1, 4/8/40, 1♀, E.S.B.; NO. 1, 14/7/40, 2♂♂, 1♀, C.D.R.; WX. 1, 13/5/40, 1♂, 2♀♀, E.S.B.; WX. 3, 17/5/40, 5♂♂, 8♀♀, E.S.B. Also Colchester (NE), P.H.

Gerris (*Gerris*) *asper* (Fieb.). Rannoch (PN), 26/5/37, no details of habitat, P.H.

Gerris (*Gerris*) *gibbifer* Schumm. SD. 21, P.H.; SD. 22, P.H.; NH. 3, 15/9/40, 9♂♂, 18♀♀, E.S.B.; SH. 45, 5/4/42, 7♂♂, 2 ♀♀, H.G.M. Also New Forest (SH), P.H.

Gerris (*Gerris*) *lacustris* (Linn.). BD. 3, 29/10/40, 2♂♂, E.S.B.; DT. 21, P.H.; DT. 24, P.H.; DF. 2, locus 1, H.D.S.; NE. 4, P.H.; SE. 2, 5/8/40, 1♂, E.S.B.; 3/9/40, 3♂♂, 1♀, E.S.B.; GW. 16, 21/8/40, many spp., G.A.W.; HT. 4, 5/4/40, 1♂, E.S.B.; 9/7/40, 12♂♂, 10 ♀♀, E.S.B.; HT. 5, 23/6/40, common, E.S.B.; HT. 6, 29/5/40, 2♂♂, 1♀, E.S.B.; HT. 8, 6/4/40, 1♀, E.S.B.; 13/7/40, 2♂♂, 1♀, E.S.B.; HT. 10, 21/4/40, 3♂♂, 1♀, E.S.B.; 24/5/40, several, E.S.B.; 7/8/40, common, E.S.B.; HT. 13, 19/6/40, 1♂, E.S.B.; HT. 14, locus 2, 4/8/40, 2♂♂, 1♀, E.S.B.; H.T. 15, locus 1, 6/8/40, 2♀♀, E.S.B.; H.U. 2, 31/7/40, 1♂, 3♀♀, C.D.R.; NO. 1, 14/7/40, 1♀, C.D.R.; 1/8/40, 1♂, 1♀, C.D.R.; NO. 3, 25/7/40, 2♀♀, C.D.R.; NO. 4, 27/8/40, 2♂♂, 1♀, C.D.R.; OX. 1, locus 1, 18/8/40, 2♂♂, 1♀ (in a calm area under the bridge), E.S.B.; locus 4, 20/8/40, common (in a calm area), E.S.B.; OX. 2, 10/8/40, 1♀, E.S.B.; OX. 4, 19/8/40, abundant, E.S.B.; OX. 5, 20/8/40, 2♂♂, 1♀, E.S.B.; SR. 6, 8/9/40, 11♂♂, 7♀♀, E.S.B.; 1/10/40, 1♂, 2♀♀, E.S.B.; EX. 2, 15/5/40, 1♂, 1♀, E.S.B.; WX. 1, 13/5/40, 3♂♂, 1♀, E.S.B.; WX. 3, 17/5/40, 7♂♂, 5♀♀, E.S.B.; SW. 6, 21/9/40, many spp., G.A.W.; SW. 7, 21/9/40, many spp., G.A.W.; SW. 8, 3/4/42, 1 ♀, H.G.M. Also New Forest (SH) and Studland (DT), P.H.

Gerris (*Gerris*) *odontogaster* (Zett.). BX. 3, 12/4/40, 1♂, 3♀♀, E.S.B.; DT. 26, P.H.; DF. 3, H.D.S.; SE. 2, 3/9/40, 2♂♂, E.S.B.; GW. 16, 21/8/40, a few macrop. spp., G.A.W.; NH. 2, 15/9/40, 2♂♂, 4♀♀, E.S.B.; HT. 4, 5/4/40, some present, E.S.B.; 9/7/40, 2♂♂, E.S.B.; HT. 7, 23/6/40, 2♂♂, 2♀♀, E.S.B.; HT. 8, 6/4/40, 2♀♀, E.S.B.; HT. 13, 19/6/40, 5♂♂, 13♀♀, E.S.B.; HT. 14, locus 1, 4/8/40, 1♂, E.S.B.; locus 2, 4/8/40, 7♂♂, 3♀♀, E.S.B.; EI. 3, locus 3, 6/35, P.H.; EI. 13, 14/6/35, P.H.; NO. 2, 18/7/40, 2♂♂, C.D.R.; R.W. 2, 16/9/41, 1♂, E.J.P.; WX. 1, 13/5/40, 2♀♀, E.S.B.; WX. 3, 17/5/40, 1♂, E.S.B.; SW. 7, 21/9/40, a few macrop. spp., G.A.W.

Gerris (*Gerris*) *argentatus* Schumm. CB. 2, 9/22, 1; 4/8/37, common, P.H.; NE. 4, P.H.; SE. 2, 5/8/40, 1♂, 2♀♀, E.S.B.; 3/9/40, 9♂♂, 2♀♀, E.S.B.; NH. 2, 15/9/40, 1♀, E.S.B.; SW. 7, 21/9/40, macrop. spp. numerous, G.A.W.

Gerris (*Aquarius*) *paludum* (Fabr.). SR. 6, 8/9/40, 2♀♀, E.S.B. They were quite common along two short stretches of the canal, but difficult to catch.

Gerris (*Aquarius*) *najas* (Deg.). SH. 28, P.H.; HT. 15, locus 1, a small colony, E.S.B. Also on river Stour (Norfolk-Suffolk border), P.H.

Veliidae.

Microvelia pygmaea (Duf.). WC. 1, 17/5/39, P.H.; SH. 27, 26/3/38 and 18/8/38, P.H.

Microvelia reticulata (Burm.). BK. 6, 25/11/06, P.H.; DT. 24, 25/11/34, P.H.; SE. 2, 5/8/40, 2♂♂, 1♀, 1 nymph, E.S.B.; 3/9/40, 2♂♂, 6♀♀, 5 nymphs, E.S.B.; GW. 16, 21/8/40, many apt. spp., G.A.W.; NH. 2, 15/9/40, several adults and nymphs, E.S.B.; HT. 3, 3/4/40, 1♂, 1♀, E.S.B.; 4/4/40, 2♂♂, 10♀♀, E.S.B.; 12/6/40, about 20 nymphs, E.S.B.; EI. 10, 24/2/44, P.H.; OX. 4, 19/8/40, 1♀, E.S.B.; EX. 1, 16/4/22, P.H.; SW. 6, 21/9/40, a few apt. spp., G.A.W. Also St. Osyth (NE), P.H.

Microvelia umbricola Wrobl. EN. 2, 6/8/38, many apt. spp., G.A.W.

Velia currens (Fabr.). SD. 20, P.H.; DF. 1, H.D.S.; SE. 4, 5/8/40, adults and nymphs abundant, E.S.B.; NH. 3, 15/9/40, 7♂♂, 5♀♀, 3 nymphs, E.S.B.; HT. 9, 31/5/40, nymphs common, E.S.B.; 3/8/40, adults and nymphs common, E.S.B.; HU. 2, 31/7/40, 3 nymphs, C.D.R.; OX. 1, locus 1, 18/8/40, 1 nymph, E.S.B. Also Colchester (NE), New Forest (SH), Aviemore (EI), P.H.

MESOVELIIDAE.

Mesovelia furcata M. & R. DT. 14, P.H.; SE. 2, 5/8/40 and 3/9/40, nymphs common, E.S.B.; HT. 15, locus 1, 6/8/40, a single nymph, E.S.B.; SW. 6, 21/9/40, a few on floating lily leaves along north bank, G.A.W.

HEBRIDAE.

Hebrus pusillus (Fall.). DT. 23, P.H.; SR. 5, P.H. Also found in New Forest (SH), P.H.

Hebrus ruficeps (Thoms.). BK. 4, P.H.; DT. 9, common, P.H.; SH. 23, common, P.H.; SR. 4, common, P.H.

SALDIDAE.

Halosalda lateralis (Fall.). DT. 10, 30/9/34, P.H.; DT. 35, 15/8/38, many spp., including a brachypterous melanic ♀, G.A.W.; EL. 2, 22/7/36, common, P.H.; NE. 6, on tidal flats, P.H.; NE. 8, P.H.; SH. 33, P.H. Additional record with no detail of habitat — Weymouth (DT), coll. W. West (P.H.).

Salda littoralis (Linn.). DT. 10, 9/7/35, P.H.; DT. 33, 15/8/38, a few, G.A.W.; DT. 35, 15/8/38, a few, G.A.W.; DT. 36, 15/8/38, many spp., some in copula and one ♂ macrop., G.A.W.; EL. 1, 22/7/36, P.H.; NE. 1, P.H.; NE. 6, taken off water on rising tide, P.H.; SH. 33, P.H.; EI. 3, locus 1, P.H.; EI. 4, 6/8/36, P.H.; EI. 8, 13/6/28, P.H.; PN. 1, locus 1, 7/21, P.H.; RW. 1, 8/6/33, P.H. Additional record with no detail of habitat — Nethybridge (EI), 15/7/32, P.H.

Saldula scotica (Curt.). DF. 3, locus 2, H.D.S.; EL. 4, 24/7/34, P.H.; EI. 4, 6/8/36, P.H.; EI. 6, P.H.; PN. 4, locus 1, 7/21, P.H. 'Common among stones and boulders, river banks and lochs, very general' (P.H.).

Saldula orthochila (Fieb.). EI. 3, locus 2, 17/6/37, 24 ad. and nymphs; 23/8/39, 12 ad. and nymphs, P.H.; EI. 5, 8/36, 1; 14/7/34, 1, P.H.; WS. 1, 13/9/31, P.H. Additional records with no detail of habitat — Nethybridge (EI), 6/13, 1; 7/30, 1, P.H.; Sharpenhoe (BD), 13/7/24, P.H.

Saldula saltatoria (Linn.). DT. 12, P.H.; DT. 19, P.H.; DT. 21, P.H.; DT. 22, P.H.; EK. 1 and WK. 1, 1939-1944, sparingly, A.M.M.

Saldula c-album (Fieb.). SD. 20, 8/10/34, 3 (probably common), P.H.; EI. 1, 12/9/24, 21/7/26, 8/29 and 21/7/34, P.H.; EI. 2, P.H.; EI. 7, locus 1, 31/5/37, P.H.; locus 2, 27/5/37, P.H.; PN. 1, locus 1, 7/21, 24/5/37 and 30/5/35, P.H.; PN. 2, 27/5/37, P.H. 'A common northern species' (P.H.).

Saldula setulosa (Puton). DT. 3, P.H.; DT. 13, P.H.

Saldula pilosella (Thoms.). DT. 11, P.H.; DT. 18, P.H.; DT. 33, 15/8/38, many spp., G.A.W.; SH. 33, P.H.; EK. 1 and WK. 1, 1939-1944, sparingly, A.M.M.

Saldula pallipes (Fabr.). DT. 10, P.H.; DF. 4, H.D.S.; EL. 2, 22/7/36, P.H.; NE. 6, on tidal flats, P.H.; SH. 33, P.H.; EK. 1 and WK. 1, 1939-1944, sparingly, A.M.M.

Saldula arenicola (Scholtz). DT. 6, 21/6/37, 1, P.H.; SH. 21, 19/9/34, fairly common, P.H.

Micracanthia marginalis (Fall.). DT. 30, 6/42, small colony, P.H.

Chartoscirta cincta (H.-S.). DT. 9, P.H.; NE. 1, P.H.; SH. 22, P.H.; EK. 1 and WK. 1, 1939—1944, sparingly, A.M.M.

Chartoscirta elegantula (Fall.). CB. 1, common, some nymphs, P.H.; DT. 17, 17/9/39, 10 (probably common), P.H.; EK. 1 and WK. 1, March-May and August-September, 1939-1944, in profusion, A.M.M.

Chartoscirta cocksi (Curt.). BK. 4, P.H.; DT. 9, P.H.; DT. 16, P.H.; SH. 23, P.H.; EI. 27, P.H.; EK. 1 and WK. 1, 1939-1944, sparingly, A.M.M.

APHELOCHEIRIDAE.

Aphelocheirus montandoni Horv. DB. 1, 10/9/39, nymphs not uncommon, E.J.P.; FT. 1, 10/9/39, 2 nymphs, E.J.P.; SH. 37, locus 1, 6/9/36, P.H.; SH. 38, locus 1, 18/9/36, many nymphs, P.H.; this habitat is on the Dorset-Hants border. HT. 15, locus 2, 6/8/40, 1 nymph, C.D.R.; OX. 1, locus 1, 14/8/40, 1 adult, 2 nymphs; 18/8/40, 2♂♂, 15♀♀, 11 nymphs; 22/8/40, 17♂♂, 14♀♀, 2 nymphs; locus 3, 19/8/40, 5 adults, 47 nymphs; locus 4, 20/8/40, 2♂♂, 2♀♀, 37 nymphs, E.S.B.

NAUCORIDAE.

Ilyocoris cimicoides (Linn.). DT. 15, P.H.; NE. 4, P.H.; SE. 2, 5/8/40, 3 nymphs, E.S.B.; 3/9/40, a few nymphs, E.S.B.; NH. 2, 15/9/40, 1♀, 1 nymph, E.S.B.; SH. 26, P.H.; HT. 3, 7/10/40, 1♂, 1♀, E.S.B.; SR. 6, 8/9/40, 1♂, E.S.B.

NEPIDAE.

Nepa cinerea Linn. BD. 1, 23/10/40, 1 cast skin, E.S.B.; DT. 27, P.H.; NE. 3, P.H.; SE. 2, 5/8/40, 9 nymphs, E.S.B.; 3/9/40, a few nymphs, E.S.B.; NH. 3, 15/9/40, 1 nymph,

E.S.B.; SH. 26, P.H.; NO. 2, 1/8/40, 2 adults, 3 nymphs, C.D.R.; NO. 3, 25/7/40, 1 nymph, C.D.R.; NO. 4, 27/8/40, 1 adult, 1 nymph, C.D.R.; OX. 2, 10/8/40, 1 adult, 1 nymph, E.S.B.; OX. 5, 20/8/40, 3 nymphs, E.S.B.; S.R. 6, 8/9/40, 1 nymph, E.S.B.; SW. 7, 21/9/40, a few, G.A.W.

Ranatra linearis (Linn.). DT. 15, 4/9/37, P.H.; DT. 26, 4/4/36, P.H.; DT. 27, 29/4/37, P.H.; SE. 2, 3/9/40, 1 adult, E.S.B.; OX. 4, 19/8/40, 1 adult, 1 nymph, E.S.B.; SR. 6, 8/9/40, 1 adult, 1 nymph, E.S.B.

Pleidae.

Plea leachi MacGregor. DT. 15, P.H.; NE. 3, P.H.; NE. 7, P.H.; SE. 1, 2/7/40, 8 adults, E.S.B.; NH. 2, 15/9/40, 7 adults, E.S.B.; SH. 26, P.H.; HT. 14, locus 1, 4/8/40, 1 nymph, E.S.B.; NO. 1, 14/7/40, 5 nymphs, C.D.R.; 1/8/40, 2 adults, 22 nymphs, C.D.R.

Notonectidae.

Notonecta glauca Linn. BD. 1, 23/10/40, 1, E.S.B.; BD. 3, 29/10/40, 4, E.S.B.; BX. 2, 12/4/40, 1, E.S.B.; BX. 3, 12/4/40, 1, E.S.B.; CB. 3, 1/5/41, H.G.M.; CB. 5, 4/41, H.G.M.; CB. 6, 4/41, H.G.M.; CB. 13, 5/41, H.G.M.; CB. 16, 3/5/41, H.G.M.; DT. 24, P.H.; DT. 26, P.H.; NE. 3, P.H.; SE. 2, 5/8/40, 1, E.S.B.; 3/9/40, several, E.S.B.; SE. 5, 5/8/40, two or three, E.S.B.; GW. 16, 21/8/40, many, G.A.W.; NH. 2, 15/9/40, 2, E.S.B.; NH. 3, 15/9/40, 1, E.S.B.; SH. 26, P.H.; HT. 4, 5/4/40, 1, E.S.B.; 9/7/40, 1, E.S.B.; HT. 7, 7/10/40, 12, E.S.B.; HT. 9, 3/8/40, 1, E.S.B.; HT. 10, 24/5/40, 1, E.S.B.; HT. 14, locus 1, 4/8/40, 2, E.S.B.; locus 2, 4/8/40, 1, E.S.B.; HT. 15, locus 1, 6/8/40, 1, E.S.B.; HU. 1, 19/7/40, 2, C.D.R.; HU. 2, 31/7/40, 4, C.D.R.; EN. 2, 6/8/38, a few, G.A.W.; EN. 3, 6/8/38, 18, G.A.W.; NO. 1, 14/7/40, 4, C.D.R.; 1/8/40, 5, C.D.R.; NO. 2, 18/7/40, 9, C.D.R.; 1/8/40, 5, C.D.R.; NO. 3, 25/7/40, 5, C.D.R.; NO. 4, 27/8/40, 15, C.D.R.; OX. 2, 16/4/40, 2, E.S.B.; OX. 4, 19/8/40, 3, E.S.B.; SR. 6, 8/9/40, several, E.S.B.; EX. 2, 15/5/40, 3, E.S.B.; WX. 1, 13/5/40, 1, E.S.B.; WX. 3, 17/5/40, 1, E.S.B.; SW. 7, 21/9/40, a few, G.A.W.

Notonecta obliqua Gallen. BK. 7, P.H.; DT. 15, P.H.; NH. 1, P.H.; SH. 26, P.H.; SH. 44, 5/4/42, 2, H.G.M.; HT. 4, 9/7/40, 6, E.S.B.; HT. 7, 7/10/40, 1, E.S.B.; HT. 14, locus 1, 4/8/40, 6, E.S.B.; locus 2, 4/8/40, 2, E.S.B.; EI. 15, 29/5/37, 1, P.H.; RW. 2, 16/9/41, 1, E.J.P.

Notonecta maculata Fabr. SD. 23, 1, P.H.; SE. 5, 5/8/40, 1 adult, E.S.B.; SH. 39, 1, P.H.; HT. 10, abundant; they

are always present in this brick pool, and usually in another similar one close by; 9/4/40, 5 adults; 21/4/40, nymphs abundant, small; 24/5/40, nymphs abundant, larvae; and two adults freshly emerged; 11/7/40, mostly adult, abundant; 7/8/40, all adult, still abundant; 3/11/40, adults common, not so abundant, E.S.B.; NO. 4, 27/8/40, 2 adults, C.D.R. Also Sudbury (WS), P.H.

Notonecta viridis Delc. BD. 1, 23/10/40, 3, E.S.B.; BX. 3, 12/4/40, 2, E.S.B.; CB. 6, 4/41, H.G.M.; CB. 13, 5/41, H.G.M.; DT. 24, P.H.; NE. 7, P.H.; SH. 29, P.H.; SH. 41, P.H.; HT. 14, locus 1, 4/8/40, 2, E.S.B.; NO. 1, 1/8/40, 7, C.D.R.

CORIXIDAE.

Corixa (*Corixa*) *punctata* (Ill.). BD. 1, 23/10/40, 2♂♂, 2♀♀, E.S.B.; BX. 2, 12/4/40, 1♀, E.S.B.; BX. 5, 13/4/40, 2♂♂, 2♀♀, E.S.B.; BX. 6, 13/4/40, 5♀♀, E.S.B.; CB. 5, 4/41, H.G.M.; CB. 12, 7/5/41, H.G.M.; CB. 13, 5/41, H.G.M.; CB. 16, 3/5/41, 1♂, 10♀♀, H.G.M.; CB. 17, 3/5/41, 1♀, H.G.M.; CB. 18, 5/41, H.G.M.; DT. 24, P.H.; DT. 26, P.H.; SH. 26, P.H.; SH. 35, P.H.; SH. 44, 5/4/42, 5♀♀, H.G.M.; HT. 4, 5/4/40, 1♂, E.S.B.; HT. 7, 7/10/40, 1♂, 2♀♀, E.S.B.; HT. 11, 10/4/40, 1♀, E.S.B.; HT. 12, locus 2, 3/8/40, 3♂♂, 2♀♀, E.S.B.; HT. 14, locus 1, 4/8/40, 4♀♀, E.S.B.; locus 2, 4/8/40, 3♂♂, 8♀♀, E.S.B.; HU. 1, 19/7/40, 4♂♂, 2♀♀, C.D.R.; EI. 14, P.H.; EI. 26, P.H.; EN. 3, 6/8/38, 3♀♀, G.A.W.; WN. 1, 4/5/41, H.G.M.; WN. 3, 5/41, 1♂, H.G.M.; NO. 1, 14/7/40, 4♂♂, 5♀♀, C.D.R.; 1/8/40, 1♀, C.D.R.; NO. 2, 18/7/40, 4♂♂, 4♀♀, C.D.R.; 1/8/40, 9♂♂, 7♀♀, C.D.R.; NO. 4, 27/8/40, 2♀♀, C.D.R.; EX. 2, 15/5/40, 1♂, 4♀♀, E.S.B.; WX. 2, 14/5/40, 2♀♀, E.S.B.; SW. 8, 3/4/42, H.G.M.

Corixa (*Corixa*) *affinis* Leach. NE. 7, 26/12/36, P.H.; only found in one large hole containing many old pots, pans, etc.

Corixa (*Corixa*) *panzeri* (Fieb.). BX. 2, 12/4/40, 1♂, 1♀, E.S.B.; SH. 35, P.H.

Corixa (*Corixa*) *dentipes* (Thoms.). EI. 26, 3/6/35 and 12/8/36, rather common, P.H. *C. punctata* was not observed in this pond until 1943. EN. 3, 6/8/38, 1♂, G.A.W.; WN. 3, 5/41, 2♂♂, H.G.M.; NO. 4, 27/8/40, 1♂, C.D.R.

Corixa (*Sigara*) *striata* (Linn.). BD. 2, 29/10/40, 1♂, E.S.B.; BK. 9, P.H.; BX. 5, 13/4/40, 1♀, E.S.B.; CB. 3, 1/5/41, dominant, H.G.M.; CB. 5, 4/41, dominant, H.G.M.; CB. 7, 4/41, 2/5/41, dominant, H.G.M.; CB. 8, 2/5/41, H.G.M.;

CB. 11, 6/5/41, dominant, H.G.M.; CB. 12, 7/5/41, dominant, H.G.M.; CB. 14, 5/41, H.G.M.; DT. 28, P.H.; SE. 2, 5/8/40, 1♀, E.S.B.; 3/9/40, 1♂, E.S.B.; GW. 16, 21/8/40, 20♂♂, 30♀♀, G.A.W.; SH. 37, locus 2, P.H.; HT. 11, 10/4/40, 1♂, 1♀, E.S.B.; HT. 12, locus 2, 3/8/40, 1♂, 2♀♀, E.S.B.; HT. 14, locus 1, 4/8/40, 1♂, E.S.B.; HT. 15, locus 1, 6/8/40, 3♂♂, 5♀♀, E.S.B.; locus 2, 6/8/40, 4♂♂, 4♀♀, E.S.B.; EN. 2, 6/8/38, 1♀, G.A.W;. NO. 1, 14/7/40, 1♂, C.D.R.; OX. 1, locus 2, 16/4/40, 1♂, 4♀♀, E.S.B.; 21/8/40, 11♂♂, 9♀♀, E.S.B.; OX. 2, 16/4/40, 4♂♂, 7♀♀, E.S.B.; 10/8/40, 2♀♀, E.S.B.; OX. 4, 19/8/40, 1♂, 2♀♀, E.S.B.; OX. 5, 20/8/40, 2♀♀, E.S.B.; OX. 6, 16/4/40, 1♂, 4♀♀, E.S.B.; SR. 6, 8/9/40, 1♂, E.S.B.; EX. 2, 15/5/40, 1♀, E.S.B.; WX. 2, 14/5/40, 1♀, E.S.B.; WX. 3, 17/5/40, 1♂, 1♀, E.S.B.

Corixa (*Retrocorixa*) *venusta* (D. & S.). SH. 31, P.H.; EI. 19, P.H.; EI. 20, locus 2, 1/6/37, common, P.H.; EI. 28, 13/11/44, 6♂♂, 4♀♀, P.H.; PN. 4, 25/5/37, P.H.

Corixa (*Retrocorixa*) *semistriata* (Fieb.). EN. 2, 6/8/38, 1♀, G.A.W.

Corixa (*Retrocorixa*) *limitata* (Fieb.). BD. 1, 23/10/40, 1♂, E.S.B.; BD. 4, locus 1, 29/10/40, 1♂, E.S.B.; BX. 2, 12/4/40, 1♂, E.S.B.; BX. 3, 12/4/40, 4♂♂, 1♀, E.S.B.; EL. 3, 7/8/36, common, P.H.; SH. 26, P.H.; SH. 40, P.H.; SH. 44, 5/4/42, 7♂♂, 1♀, H.G.M.; HU. 1, 19/7/40, 3♂♂, 10♀♀, C.D.R.; NO. 2, 18/7/40, 1♂, C.D.R.; 1/8/40, 2♂♂, 1♀, C.D.R.

Corixa (*Vermicorixa*) *lateralis* (Leach). BD. 1, 23/10/40, 2♂♂, 2♀♀, E.S.B.; BX. 1, 12/4/40, 1♂, 5♀♀, E.S.B.; BX. 3, 12/4/40, 2♂♂, E.S.B.; BX. 5, 13/4/40, 1♀, E.S.B.; CB. 16, 3/5/41, 1♂, 1♀, H.G.M.; CB. 17, 3/5/41, 13♂♂, 9♀♀, H.G.M.; CB. 21, 5/41, 2♀♀, H.G.M.; SH. 44, 5/4/42, 1♂, 6♀♀, H.G.M.; HT. 5, 5/4/40, 1, E.S.B.; HT. 7, 5/4/40, 1, E.S.B.; HT. 11, 10/4/40, 2♀♀, E.S.B.; HT. 12, locus 1, 23/5/40, 9♂♂, 10♀♀, E.S.B.; 16/6/40, quite common, E.S.B.; locus 2, 3/8/40, 4♂♂, E.S.B.; HU.1, 19/7/40, 5♂♂, 3♀♀, C.D.R.; WN. 1, 4/5/41, H.G.M.; WN. 2, 4/5/41, H.G.M.; NO. 2, 18/7/40, 3♂♂, 2♀♀, C.D.R.; 1/8/40, 2♂♂, 5♀♀, C.D.R.; EX. 2, 15/5/40, 22♂♂, 42♀♀, E.S.B.; WX. 2, 14/5/40, 64♂♂, 25♀♀, E.S.B.; SW. 8, 3/4/42, 1♀, H.G.M.

Corixa (*Vermicorixa*) *nigrolineata* (Fieb.). BX. 1, 12/4/40, 4♂♂, 16♀♀, E.S.B.; BX. 5, 13/4/40, 2♂♂, 2♀♀, E.S.B.; BX. 6, 13/4/40, 3♂♂, 11♀♀, E.S.B.; C.B. 10, 4/5/41, H.G.M.; CB. 11, 6/5/41, H.G.M.; CB. 16, 3/5/41, 4♂♂,

2♀♀, H.G.M.; CB. 17, 10♂♂, 14♀♀, H.G.M.; DT. 8, P.H.; DT. 24, P.H.; DT. 27, P.H.; GW. 16, 21/8/40, 1♂, G.A.W.; SH. 36, P.H.; HT. 5, 23/6/40, 1, E.S.B.; HT. 6, 6/4/40, 2♂♂, 2♀♀, E.S.B.; 29/5/40, 6♂♂, 14♀♀, E.S.B.; HT. 7, 7/10/40, 9♂♂, 7♀♀, E.S.B.; HT. 9, 3/8/40, 4♂♂, 6♀♀, E.S.B.; HT. 10, 9/4/40, 1♀, E.S.B.; HT. 11, 10/4/40 3♀♀, E.S.B.; HT. 12, locus 1, 23/5/40, 2♂♂, 1♀, E.S.B.; HT. 14, locus 1, 4/8/40, 1♀, E.S.B.; locus 2, 4/8/40, 4♂♂, 2♀♀, E.S.B.; HU. 2, 31/7/40, 2♂♂, 1♀, C.D.R.; EI. 12, 13/11/44, 8♀♀, P.H.; EI. 28, 13/11/44, 1♂, P.H.; WN. 1, 4/5/41, H.G.M.; WN. 2, 4/5/41, H.G.M.; NO. 2, 18/7/40, 1♂, 2♀♀, C.D.R.; OX. 3, 14/8/40, 9♂♂, 7♀♀, E.S.B.; EX. 2, 15/5/40, 15♂♂, 24♀♀, E.S.B.; WX. 2, 14/5/40, 1♂, E.S.B.; SW. 8, 3/4/42, 4♂♂, 3♀♀, H.G.M.

Corixa (*Vermicorixa*) *concinna* (Fieb.). SH. 26, P.H.; NO. 1, 14/7/40, 1♀, C.D.R.; EX. 2, 15/5/40, 1♂, 1♀, E.S.B.; WX. 2, 14/5/40, 1♀, E.S.B.

Corixa (*Halicorixa*) *stagnalis* (Leach). DT. 31, 15/8/38 38♂♂, 22♀♀, 29 nymphs, G.A.W.; GW. 16, 21/9/40, 5♂♂, 4♀♀, G.A.W.

Corixa (*Halicorixa*) *selecta* (Fieb.). DT. 32, 15/8/38, 4♂♂, 2♀♀, G.A.W.; DT. 35, 15/8/38, a few, G.A.W.; NE. 7, 26/12/36, common, P.H.; SH. 34, 15/2/36, common, P.H.; SH. 42, 26/9/36, common, P.H.

Corixa (*Anticorixa*) *linnei* (Fieb.). BD. 1, 23/10/40, 2♂♂, E.S.B.; BX. 5, 13/4/40, 2♂♂, E.S.B.; CB. 3, 1/5/41, H.G.M.; CB. 4, 1/5/41, H.G.M.; CB. 8, 2/5/41, H.G.M.; CB. 10, 4/5/41, H.G.M.; CB. 12, 7/5/41, H.G.M.; CB. 18, 5/41, 3♂♂, 9♀♀, H.G.M.; CB. 19, 5/41, 1♂, 1♀, H.G.M.; CB. 20, 5/41, 5♂♂, 8♀♀, H.G.M.; CB. 21, 5/41, H.G.M.; DT. 24, P.H.; SE. 1, 2/7/40, 1♂, 1♀, E.S.B.; SE. 2, 5/8/40, 1♂, 1♀, E.S.B.; GW. 16, 21/9/40, 11♂♂, 2♀♀, G.A.W.; SH. 26, P.H.; SH. 35, P.H.; HT. 7, 5/4/40, 1, E.S.B.; EI. 3, locus 4, 10/6/35, P.H.; EI. 24, 12/8/36, 1, P.H.; EN. 2, 6/8/38, 9♂♂, 2♀♀, G.A.W.; NO. 1, 1/8/40, 1♀, C.D.R.; NO. 2, 18/7/40, 5♂♂, 5♀♀, C.D.R.; 1/8/40, 1♂, C.D.R.; EX. 2, 15/5/40, 2♂♂, E.S.B.; WX. 3, 17/5/40, 1♂, E.S.B.

Corixa (*Anticorixa*) *sahlbergi* (Fieb.). BX. 5, 13/4/40, 2♂♂, 2♀♀, E.S.B.; BX. 6, 13/4/40, 1♂, 1♀, E.S.B.; CB. 3, 1/5/41, H.G.M.; CB. 5, 4/41, H.G.M.; CB. 8, 2/5/41, H.G.M.; CB. 10, 4/5/41, H.G.M.; CB. 11, 6/5/41, H.G.M.; CB. 12, 7/5/41, H.G.M.; CB. 15, 5/41, H.G.M.; CB. 16, 3/5/41, 4♀♀, H.G.M.; CB. 17, 3/5/41, 2♀♀, H.G.M.; CB. 19, 5/41, 3♂♂, 3♀♀, H.G.M.; CB. 20, 5/41, 3♂♂,

2♀♀, H.G.M.; SE. 3, 5/8/40, common, E.S.B.; GW. 16, 21/9/40, 1♀, G.A.W.; NH. 3, 15/9/40, 1♂, 3♀♀, E.S.B.; SH. 26, P.H.; SH. 35, P.H.; HT. 3, 3/4/40, 2, E.S.B.; 5/10/40, 1♂, E.S.B.; 7/10/40, 2♀♀, E.S.B.; HT. 4, 9/7/40, 6♂♂, 1♀, E.S.B.; HT. 7, 7/10/40, 2♂♂, 2♀♀, E.S.B.; HT. 8, 6/4/40, 4♂♂, 9♀♀, E.S.B.; 13/7/40, 6♂♂, 1♀, E.S.B.; HT. 9, 3/8/40, 1♂, 2♀♀, E.S.B.; HT. 11, 10/4/40, 2♂♂, 1♀, E.S.B.; 16/6/40, 1♀, E.S.B.; HT. 12, locus 2, 3/8/40, 1♂, 2♀♀, E.S.B.; HT. 14, locus 2, 4/8/40, 1♂, E.S.B.; HU. 1, 19/7/40, 1♀, C.D.R.; HU. 2, 31/7/40, 5♂♂, 8♀♀, C.D.R.; EI. 24, P.H.; EI. 25, 8/8/36, P.H.; EN. 2, 6/8/38, 4♂♂, 8♀♀, G.A.W.; EN. 3, 6/8/38, 2♂♂, 3♀♀, G.A.W.; WN. 1, 4/5/41, H.G.M.; NO. 2, 18/7/40, 1♂, C.D.R.; NO. 4, 27/8/40, 2♂♂, 1♀, C.D.R.; RW. 2, 16/9/41, 1♂, E.J.P.; EX. 2, 15/5/40, 4♂♂, 3♀♀, E.S.B.; WX. 2, 14/5/40, 1♂, E.S.B. Also Forres (EL), P.H.

Corixa (*Anticorixa*) *moesta* (Fieb.). BD. 1, 23/10/40, 3♂♂, 6♀♀, E.S.B.; CB. 16, 3/5/41, 6♂♂, 7♀♀, H.G.M.; CB. 17, 3/5/41, 1♂, H.G.M.; DT. 29, 7/11/36, common, P.H.; SE. 5, 5/8/40, 1♂, E.S.B.; SH. 43, 29/11/36, common, P.H.; HT. 3, 7/8/40, 1♂, 1♀, E.S.B.; 5/10/40, 1♀, E.S.B.; HT. 7, 7/10/40, 1♀, E.S.B.; HT. 9, 3/8/40, 1♂, 1♀, E.S.B.; HT. 14, locus 1, 4/8/40, 4♂♂, E.S.B.; HU. 2, 31/7/40, 2♂♂, 2♀♀, C.D.R.; NO. 2, 18/7/40, 1♂, C.D.R.; SW. 5, 25/10/36, common, P.H.

Corixa (*Anticorixa*) *castanea* (Thoms.). BK. 8, P.H.; SD. 22, 6/10/34, P.H.; DT. 15, P.H.; DT. 25, P.H.; SH. 32, P.H.; EI. 23, 18/6/35, common, P.H.; EI. 28, 13/11/44, 5♂♂, 8♀♀, P.H.; RW. 2, 16/9/41, 3♂♂, 2♀♀, E.J.P.

Corixa (*Subsigara*) *fossarum* (Leach). BD. 1, 23/10/40, 21♂♂, 27♀♀, E.S.B.; BD. 4, locus 1, 29/10/40, 3♂♂, 2♀♀, E.S.B.; BX. 4, 13/4/40, 1♀, E.S.B.; CB. 8, 2/5/41, H.G.M.; CB. 18, 5/41, 15♂♂, 29♀♀, H.G.M.; CB. 21, 5/41, 1♀, H.G.M.; DT. 24, P.H.; SE. 1, 2/7/40, 7♂♂, 3♀♀, E.S.B.; GW. 16, 21/8/40, 1♂, 3♀♀, G.A.W.; SH. 38, locus 2, 7/9/36, P.H.; HT. 12, locus 1, 23/5/40, 1♂, 7♀♀, E.S.B.; HU. 1, 19/7/40, 1♀, C.D.R.; HU. 2, 31/7/40, 1♂, C.D.R.; EN. 2, 6/8/38, 5♂♂, 4♀♀, G.A.W.; NO. 1, 14/7/40, 1♂, 1♀, C.D.R.; 1/8/40, 5♀♀, C.D.R.; NO. 2, 1/8/40, 1♀, C.D.R.; NO. 3, 25/7/40, 2♀♀, C.D.R.; NO. 4, 27/8/40, 1♀, C.D.R.; EX. 2, 15/5/40, 1♂, 1♀, E.S.B.; WX. 2, 14/5/40, 1♀, E.S.B.

Corixa (*Subsigara*) *scotti* ((Fieb.) D. & S.). DT. 15, P.H.; SH. 26, P.H.; EI. 3, locus 4, P.H.; EI. 12, 13/11/44, 33♂♂, 59♀♀, P.H.; EI. 18, P.H.; RW. 2, 16/9/41, 2♂♂, 2♀♀, E.J.P. Common everywhere in EI, P.H.

Corixa (*Subsigara*) *falleni* (Fieb.). BD. 4, locus 2, 29/10/40, 1♂, E.S.B.; BX. 2, 12/4/40, 1♀, E.S.B.; BX. 4, 13/4/40, 1♀, E.S.B.; CB. 5, 4/41, H.G.M.; CB. 7, 4/41, 2/5/41, H.G.M.; CB. 9, 4/41, H.G.M.; CB. 11, 6/5/41, H.G.M.; CB. 12, 7/5/41, H.G.M.; GW. 16, 21/8/40, 1♂, 1♀, G.A.W.; HT. 5, 5/4/40, 1, E.S.B.; HT. 15, locus 1, 6/8/40, 11♂♂, 12♀♀, E.S.B.; locus 2, 6/8/40, 1♂, 2♀♀, E.S.B.; OX. 1, locus 2, 21/8/40, 2♂♂, 2♀♀, E.S.B.; OX. 2, 16/4/40, 2♂♂, 1♀, E.S.B.; OX. 4, 19/8/40, 1♂, 1♀, E.S.B.; OX. 6, 16/4/40, 1♂, E.S.B.; SS. 1, P.H.; EX. 2, 15/5/40, 9♂♂, 9♀♀, E.S.B.; WX. 2, 14/5/40, 2♂♂, 4♀♀, E.S.B. Also at Chichester (WX) and Takeley (NE), P.H.

Corixa (*Subsigara*) *distincta* (Fieb.). CB. 17, 3/5/41, 1♂, 1♀, H.G.M.; DT. 24, P.H.; EL. 3, 7/8/36, P.H.; SE. 1, 2/7/40, 13♂♂, 23 ♀♀, E.S.B.; SH. 26, P.H.; SH. 44, 5/4/42, 13♂♂, 4♀♀, H.G.M.; HT. 12, locus 1, 23/5/40, 1♂, 1♀, E.S.B.; HU. 1, 19/7/40, 2♂♂, 6♀♀, C.D.R.; EI. 3, locus 4, 10/6/35, P.H.; EI. 18, 3/6/35, P.H.; EN. 2, 6/8/38, 1♂, 2♀♀, G.A.W.; WN. 3, 5/41, 5♂♂, 3♀♀, H.G.M.; NO. 1, 1/8/40, 2♂♂, 1♀, C.D.R.; NO. 2, 1/8/40, 1♀, C.D.R.; NO. 4, 27/8/40, 1♀, C.D.R. Also at Nethybridge (EI), 10/8/36 P.H. Very common in Aviemore (EI) district, P.H.

Corixa (*Arctocorisa*) *carinata* (C. Sahlb.). EI. 17, 11/8/36, P.H.; EI. 20, locus 1, 1/6/37 and 14/6/37, 5 in all, P.H.; EI. 21, 14/6/35, including a pair in cop., P.H.; EI. 22, 17/3/43, abundant, P.H.

Corixa (*Arctocorisa*) *germari* (Fieb.). EI. 16, P.H.; EI. 20, 14/6/37, scarce, P.H.; PN. 4, 25/5/37, P.H.

Corixa (*Callicorixa*) *praeusta* (Fieb.). CB. 8, 4/41, 1♀, H.G.M.; CB. 14, 5/41, 1♂, 3♀♀, H.G.M.; CB. 18, 5/41, 1♂, H.G.M.; CB. 19, 5/41, 1♂, H.G.M.; CB. 21, 5/41, 1♀, H.G.M.; DT. 20, P.H.; DT. 24, P.H.; EL. 3, 7/8/36, P.H.; SE. 1, 2/7/40, 3♂♂, 1♀, E.S.B.; GW. 16, 21/8/40, 1♂, 2♀♀, G.A.W.; SH. 26, P.H.; SH. 44, 5/4/42, 3♂♂, 4♀♀, H.G.M.; HT. 8, 6/4/40, 1♂, E.S.B.; HT. 12, locus 1, 16/6/40, several, E.S.B.; locus 2, 23/5/40, 1♀, E.S.B.; 3/8/40, 3♂♂, 2♀♀, E.S.B.; HT. 13, 19/6/40, 1♀, E.S.B.; HT. 14, locus 1, 4/8/40, 1♀, E.S.B.; EN. 2, 6/8/38, 2♀♀, G.A.W.; WN. 1, 4/5/41, H.G.M.; NO. 1, 14/7/40, 1♂, 1♀, C.D.R.; EX. 2, 15/5/40, 8♂♂, 11♀♀, E.S.B.; WX. 2, 14/5/40, 1♂, 1♀, E.S.B.; SW. 8, 3/4/42, 1♀, H.G.M.

Corixa (*Callicorixa*) *wollastoni* (D. & S.). EI. 12, 13/11/44, 20♂♂, 28♀♀, P.H.; EI. 17, 10/8/36, fairly common, P.H.; EI. 28, 13/11/44, 1♂, 3 ♀♀, P.H.

Glaenocorisa propinqua (Fieb.). EI. 3, locus 5, 17/6/37, several, P.H.; EI. 16, 29/5/37, several, P.H.; PN. 4, 25/5/37, rather common, P.H.

Cymatia coleoptrata (Fabr.). CB. 18, 5/41, 7♂♂, 7♀♀, H.G.M.; DT. 15, P.H.; DT. 26, P.H.; SE. 1, 2/7/40, 20♂♂, 17♀♀, E.S.B.; NH. 2, 15/9/40, 1♀, E.S.B.; SH. 26, P.H.; SR. 6, 8/9/40, 1♂, E.S.B.; 1/10/40, 1♂, E.S.B.

Cymatia bonsdorffi (C. Sahlb.). DT. 26, P.H.; SE. 1, 2/7/40, 2♂♂, 1♀, E.S.B.; SH. 26, P.H.; SH. 30, P.H.; SH. 44, 5/4/42, 1♂, H.G.M.; EI. 3, locus 4, 15/6/35, scarce, P.H.; EN. 2, 6/8/38, 1♂, 1♀ macrop., 2♂♂, 2♀♀ brachypt., G.A.W.; PN. 4, 25/5/37, P.H.

Micronecta (*Micronecta*) *minutissima* (Linn.). NE. 5, P.H. These specimens have been examined by G. A. Walton.

Micronecta (*Micronecta*) *poweri* (D. & S.). CB. 7, 4/41, nymphs very common, H.G.M.; CB. 8, 4/41, nymphs very common, H.G.M.; CB. 9, 4/41, nymphs, H.G.M.; SH. 31, 18/6/39 and 18/8/37, common, P.H.; HT. 15, locus 1, 6/8/40, 26 adults, 6 nymphs, E.S.B.; locus 3, 4/8/40, 22 adults, 2 nymphs.

Micronecta (*Dichaetonecta*) *scholtzi* (Fieb.) Scholtz. SE. 2, 5/8/40, 26, E.S.B.; SH. 1, P.H.; OX. 4, 28/5/33, 6, E.S.B.

SECTION 4. LIST AND DESCRIPTIONS OF HABITATS AND THEIR LOCI.

BEDFORDSHIRE.

BD. 1. A large pond in a quarry three miles south of Bedford, on west side of Ampthill road; dimensions about 100 × 50 yards; sides sloping fairly steeply, with little shallow water at edge. Bottom of yellow mud of clayey consistency, with black mud beneath it in parts. Little vegetation, patches of *Potamogeton natans* and a little *Ranunculus aquatilis*, and submerged grass at edge in parts. Larvae of Zygoptera common, and a few larvae of Anisoptera (including *Libellula depressa*); *Hygrobia tarda, Laccophilus minutus* and a few *Haliplus* (including *lineatocollis*), *Agabus nebulosus*. Alt. 100 feet.

BD. 2. A half-mile stretch of the River Ouse near Bedford, running west from Kempston; 20 yards across more or less, fairly deep and slow flowing. Bottom of mud and debris, the latter especially in inlets into the bank. Vegetation slight, including *Sparganium*, and in the inlets *Callitriche*. Caddis larvae, larvae of *Agrion* and other Zygoptera; *Gammarus*. Alt. about 100 feet.

BD. 3. A pond, 40 × 10 yards, on south side of River Ouse (BD. 2), and connected with it by a shallow ditch. Bottom of mud, debris, dead sticks. Fairly thick vegetation, including *Acorus*, *Callitriche*, *Sparganium ramosum*, *Rumex*, *Alisma* and a little *Elodea*. *Asellus*, water fleas, *Dendrocoelum*, *Planorbis* and *Limnaea*. Alt. about 100 feet.

BD. 4. A series of small ponds close to BD. 3, in a more advanced state of evolution, being much more thickly vegetated. *Asellus* very abundant. Alt. about 100 ft.

Locus 1. A small strip 15 × 5 yards, overhung by willows and very thickly vegetated.

Locus 2. A larger pond, less thickly vegetated, overhung by willows and other trees. *Lemna trisulca*.

Berkshire.

BK. 4. *Sphagnum*, etc., at Newbury.

BK. 5. Moles' nests near river, Newbury.

BK. 6. Pond at Newbury.

BK. 7. Ditches near canal, and ponds on common at Newbury.

BK. 8. Peaty pools at Newbury.

BK. 9. River Kennett at Thatcham; see also BK. 3 (Pearce and Walton, 1939).

Buckinghamshire.

BX. 1. A small pond, about 25 × 12 yards, on Sheepcote Farm, near Aylesbury; a stream runs in at one end and out at the other; water rather cloudy, slightly fouled by cattle. Unvegetated save for a little *Veronica beccabunga* at one end. A few Turbellaria and *Chironomus* larvae. Bottom muddy; shallow at sides. pH 8.1. Alt. 200-400 feet.

BX. 2. On 'Putlow's' farm, a few miles west of Aylesbury. A large pond, about 50 yards across, in the middle of an open field; sides shallow. Weeds in the middle on a muddy bottom; a great quantity of submerged grass and *Lemna trisulca* round the edges. Abundant *Helophorus* and caddis larvae; *Asellus*, larvae of Zygoptera, small snails and bivalves; crested newts. Railed off from cattle except at one point where it drained out into the field and was used as a drinking place. pH 7.3. Alt. 200-400 feet.

BX. 3. In field adjoining that containing BX. 2. Smaller (about 40 × 30 yards). A considerable growth of weeds, including *Potamogeton* spp., *Nasturtium*, *Ranunculus aquatilis*, submerged grass, *Lemna minor* and *Callitriche*. *Hygrobia tarda*,

Acilius sulcatus, *Hygrotus confluens*; larvae of *Cloeon* and Zygoptera; snails, caddis larvae, *Asellus*. Railed off like pond BX. 2. pH 7.3. Alt. 200-400 feet.

BX. 4. Pond in ploughed field on Sheepcote farm, near Aylesbury-Bicester road. Dimensions 30 × 25 yards; 2-3 feet deep, with shallow sides. Exposed mud in parts, but with a good growth of weeds, including *Potamogeton natans*, *Ranunculus aquatilis*, *Spirogyra*, and submerged grass at edge. Snails (*Limnaea stagnalis* and other species), caddis larvae, *Asellus*, three-spined sticklebacks. Cattle occasionally drink but it is not fouled. Hemiptera very scarce (possibly due to sticklebacks). pH 7.3. Alt. 200-400 feet.

BX. 5. Pond in field near BX. 4, smaller, but similar in general appearance. *Lemna trisulca* and *L. minor*, *Potamogeton natans*, *Spirogyra*, submerged grass at edge. Abundant Turbellaria and *Limnaea stagnalis*; caddis larvae, larvae of *Chaoborus* and Zygoptera; *Planorbis*; smooth newts. Used as a drinking place for cattle, but not visibly fouled. pH 7.2. Alt. 200-400 feet.

BX. 6. A small pond, about 15 × 12 yards, 1 foot deep, and overshadowed by willow, elder and sycamore. Bottom of mud, covered with dead sticks and debris. Submerged vegetation absent except for a trace of moribund-looking green alga. *Helophorus aquaticus*, *Asellus*, larvae of Anisoptera and Chironomidae. pH 7.35. Alt. 200-400 feet.

CAMBRIDGESHIRE.

CB. 1. Wicken Fen; main lode. Sides with short moss on mud.

CB. 2. Wicken Fen; ditches and pits.

CB. 3. Slow-flowing stream on Coe Fen, Cambridge.

CB. 4. Similar stream near CB. 3.

CB. 5. Stagnant stream on Coe Fen, above a small temporary dam, which was drying up.

CB. 6. Same stream as CB. 5, but below the dam. Fairly thick vegetation, *Elodea*, etc.

CB. 7. Slow-flowing stream on Coe Fen, with thick mud bottom, little vegetation, and many minnows; shallow.

CB. 8. Newnham millpool. Fairly shallow at edges, but deep and with strong flow in centre. Some emergent vegetation at the edges.

CB. 9. Stream by Causewayside, Coe Fen. Deep, with rather scanty vegetation and fairly fast flow.

CB. 10. Newnham College pond. Small, shallow concrete pool with water-lilies and goldfish.

CB. 11. Jesus College ditch. Stream about 6 inches to 1 foot deep with slow flow. Dense vegetation in places.

CB. 12. Pond in Botanic Gardens, Cambridge. About 2 feet deep, with muddy bottom and both floating and emergent vegetation. Collections made in the middle of the pond.

CB. 13. Chesterton Marl-pits.

CB. 14. Pond by railway at west end of Histon.

CB. 15. Pond in wood at west end of Histon.

CB. 16. Northern moat at Comberton; 6 inches to 1 foot deep. Banks mostly grass, but one or two bramble bushes. No trees. Considerable emergent vegetation in parts, and also floating *Glyceria* and *Ranunculus*.

CB. 17. Southern moat at Comberton; 6 inches to 1 foot deep. Banks mostly bare earth, with trees growing along the sides, and giving almost complete shade in parts. Little or no vegetation. Bottom composed of mud and dead elm-leaves. Some pollution from farmyard at southern end.

CB. 18. Wicken Fen—stream on edge of Fen at main entrance. Shallow, some emergent reeds which had been cut.

CB. 19. Wicken Fen—shallow pools along Sedge Fen Drove.

CB. 20. Wicken Fen. Similar pools beside Gardner's Drove.

CB. 21. Wicken Fen. Newly dug pond, about 1 foot deep, with bare peat bottom. *Haliplus* sp., *Hydroporus assimilis, Polyphemus pediculus, Bosmina longirostris, Hydrobia jenkinsi, Gammarus, Asellus,* etc. No vegetation beyond diatoms and flagellates.

Cornwall, West.

WC. 1. Shallow clay-pit near road at Helston.

Denbighshire.

DB. 1. River Dee, near Holt. Moderate to fast flow: a large river, with mud bottom, stony in places; plenty of vegetation (flags and reeds).

Devon, South.

SD. 20. Ivybridge; river banks, and edges of streams.

SD. 21. Ivybridge; backwaters of streams.

SD. 22. Peaty pools on Dartmoor.

SD. 23. Moorland pool, Haytor; possibly the same as SD. 2 (Pearce and Walton, 1939).

DORSET.

DT. 3. Mud-flats at Arne. Tidal rejectamenta lying on *Spartina*; described before by Walton (1939).

DT. 6. Undercliff at Charmouth; wet spots on cliffs.

DT. 7. Very wet moss on cliffs at Charmouth.

DT. 8. Charmouth; shallow pools on undercliff.

DT. 9. *Sphagnum* and other moss, Studland Heath; possibly the same as DT. 4 (Pearce and Walton, 1939).

DT. 10. Studland; edges of salt-marsh on tidal flats.

DT. 11. Studland; marsh between sea and tidal flats.

DT. 12. Studland; wet places in sand-dunes.

DT. 13. Studland; tidal rejectamenta lying on *Spartina*.

DT. 14. Studland; pools with *Potamogeton*.

DT. 15. Littlesea, Studland; a weedy habitat.

DT. 16. Ditches at Witchampton; mud at margins.

DT. 17. Poole Harbour; roots of grass on tidal mud, near Upton.

DT. 18. Tidal rejectamenta at Abbotsbury.

DT. 19. Dried-up pond on chalk at Cranborne.

DT. 20. Cranborne; pond in 'winter bourne'; sometimes dry for two consecutive summers, yet contained *Corixa praeusta*.

DT. 21. Ponds on heath at Parley.

DT. 22. Damp place in woods at Crichel.

DT. 23. Mud among *Juncus*, Warbarrow Bay.

DT. 24. Ponds in clay-pits at Wareham.

DT. 25. Peaty pools at Wareham.

DT. 26. Ponds in clay-pits at Corfe Castle.

DT. 27. Wimborne; weedy pond on Holt Common.

DT. 28. Running water at Holt.

DT. 29. Wimborne; grassy pond on Badbury Rings; clay and chalk.

DT. 30. Small area of dryish bog, Alderney Heath, near Wallisdown. Surrounding heath recently burnt.

DT. 31. Shallow ditch of slowly-running, cloudy water with bottom of black ooze and marginal *Phragmites*; passing under a footbridge at north end of Lodmoor, near Weymouth. *Palaemonetes varians* and many *Gammarus*. Sea-level.

DT. 32. Wide, deep ditch of stagnant greenish-brown water, with sandy peat banks and bottom of black ooze. No vegeta-

tion. *Mysis* and *Palaemonetes varians* but no *Gammarus*. This is a continuation of DT. 31. Sea-level.

DT. 33. A shallow pan in sandy peat with puddles of greenish water and very short *Phragmites* plants; at north end of foot-path across Lodmoor, near Weymouth. Sea-level.

DT. 34. Boating pond near sea front in south corner of Lodmoor, near Weymouth. Bottom of flint pebbles and much *Ruppia* and filamentous green algae. Cockles, three-spined sticklebacks, *Palaemonetes varians* and *Hydrobia jenkinsi*. Sea-level.

DT. 35. Damp hollow on Lodmoor, near Weymouth, close to the road near the boating pond DT. 34. Sides of flint pebbles and bottom of mud and covered with *Salicornia*. Sea-level.

DT. 36. Centre of Lodmoor, near Weymouth. A large flat expanse of black mud with patches of dead *Spartina* or *Phragmites*. Sea-level.

Dumfriesshire.

DF. 1. Pools and streams on moors.

DF. 2. River Kirtle.

Locus 1. Open water.

Locus 2. Gravel beds.

DF. 3. Peat pools on moss.

DF. 4. Mud on river banks, Gretna Browhouses.

Elgin.

EL. 1. Tidal flats at Forres.

EL. 2. Tidal flats, Culbin Sands, Moray Firth.

EL. 3. Pools in sand-hills, Forres.

EL. 4. River bed, Bridge of Avon.

Essex, North.

NE. 1. *Sphagnum* and other moss at Colchester.

NE. 2. Dead leaves at Colchester.

NE. 3. Ditches at Colchester; mud at edge.

NE. 4. Ponds at Colchester.

NE. 5. Undescribed habitat near Colchester; possibly saline.

NE. 6. St. Osyth; tidal flats.

NE. 7. St. Osyth; weedy brackish ditches.

NE. 8. Clacton-on-Sea; tidal flats.

Essex, South.

SE. 1. The lower of the two Golding's Hill Ponds in Epping Forest. A large pond some 100-150 yards in diameter; depth considerable in the middle, about 6 inches to 1 foot at the edge. Bottom of mud and debris, with a carpet of *Elodea canadensis* in parts; *Acorus, Equisetum limosum* and rushes round the margin. A variety of dragonflies, including *Aeshna grandis*, *Anax imperator*, *Cordulia aenea*, *Libellula quadrimaculata*, *Enallagma cyathigerum* and *Coenagrion puella* were on the wing and probably bred in the pond; a larva of *Erythromma najas* was found. *Asellus* present in small numbers; mayfly larvae. pH 6.8. Alt. 200-400 feet.

SE. 2. Wake Valley Pond, in Epping Forest, on the west side of and adjoining New Road. A large pond about 200 × 100 yards, with shallow sides. Bottom of mud with dead leaves, decaying organic matter and weeds. *Potamogeton natans*, *Nuphar luteum*, a little submerged grass and moss; round the margin a growth of *Equisetum limosum*, *Arundo phragmites* and *Acorus*. Numerous beetles including *Noterus capricornis*, *Hygrotus inaequalis*, *Hyphydrus ovatus*, *Gyrinus distinctus* and *G. paykulli*, *Ilybius fenestratus*, *I. obscurus*, and *I. fuliginosus*, *Agabus bipustulatus*; dragonflies on the wing including *Aeshna* spp., *Ischnura elegans*, *Coenagrion puella*, *Lestes sponsa* and *Sympetrum striolatum*; *Asellus*. pH 7.05. Alt. 200-400 feet.

SE. 3. A small pond in Epping Forest, about 50 × 20 yards, near SE. 2, on the opposite side of New Road. Most of the bottom covered with dead leaves and unvegetated, but there were a few weeds at one end, including *Utricularia* sp. Fauna including *Agabus sturmii*, *Acilius* larvae and adults of *A. sulcatus*; *Graptodytes pictus*. Much overhung with trees. An overhanging bank on one side formed a shelter for *Hydrometra stagnorum*. Alt. 200-400 feet.

SE. 4. Small pools in the south-west corner of Epping Forest, much sheltered by trees and evidently formed by the partial drying up of a woodland stream. Dead leaves covered the bottom in most parts. Alt. 200 feet.

SE. 5. A small pool, about ten yards across, just outside the west border of Epping Forest. A considerable growth of emergent vegetation round the edge. *Dytiscus marginalis*. Alt. 200 feet.

Flint.

FT. 1. River Clwyd, near St. Asaph. Bottom muddy, but more stony and with more rapid flow than DB. 1. A considerable amount of vegetation (flags and reeds).

Gloucester, West.

GW. 16. Pond on landward side of sea wall on shore of River Severn estuary at Sheperdine. Depth 4 feet in middle, water clear and bottom of blackened vegetable debris. Much *Callitriche* and *Ruppia* and surrounded with sedges and *Phragmites*. *Palaemonetes varians* present. Sea-level.

Hants, North.

NH. 1. Dew pond, with weeds, on Hants Downs.

NH. 2. The Basingstoke Canal, about one mile west of Aldershot and Farnborough; a stretch of about a mile between Wharf Bridge and Norris Bridge. About 10-15 yards across. Bottom muddy, but largely covered with weeds, including *Potamogeton natans* (very abundant), *Alisma*, arrowhead and submerged grass. *Gyrinus, Haliplus* spp., crayfish, *Gammarus*, leeches. Alt. 250 feet.

NH. 3. A moorland ditch near Aldershot, one mile northeast of Church Crookham, south of Basingstoke Canal; 3-4 feet wide; only a few inches deep except for a wider space clear of vegetation at one end, which was thickly populated with *Gerris gibbifera*. Bottom of mud, covered with weeds and dead sticks. Submerged grass and moss practically filled the water over most of the length studied. Several beetles including *Agabus didymus*, *A. bipustulatus*, *Hydrobius fuscipes*, and *Dytiscus semisulcatus*. Newt tadpoles; dragonfly larvae. Alt. 250-300 feet.

Hants, South.

SH. 1. Hatchet Pond, New Forest; described by Pearce and Walton (1939).

SH. 21. Wet spots on cliffs, Highcliffe-on-Sea.

SH. 22. New Forest; moss among *Juncus*.

SH. 23. New Forest; *Sphagnum* and other moss.

SH. 24. New Forest; dead leaves.

SH. 25. New Forest; wet shingle on banks of streams.

SH. 26. New Forest; ponds.

SH. 27. New Forest; bog near Bratley Beeches.

SH. 28. New Forest; streams.

SH. 29. New Forest; weedy pond at Fritham.

SH. 30. New Forest; pool near John Barleycorn Inn.

SH. 31. New Forest; running water.

SH. 32. New Forest; peaty pools.

SH. 33. Tidal flats at Lymington.

SH. 34. Weedy brackish ditches at Lymington.

SH. 35. Clay-pits at Pitt's Deep, Lymington.

SH. 36. Christchurch; small pool near salterns.

SH. 37. River Avon.
Locus 1. Weeds on bed of river.
Locus 2. Sides of river.

SH. 38. Moors River, on Dorset-Hants border.
Locus 1. Weeds on bed of river.
Locus 2. Sides of river; running water.

SH. 39. Sallow swamp at Hurn.

SH. 40. Weedy ditches at Hurn.

SH. 41. Brackish water, with weeds, at Mudeford.

SH. 42. Brackish ditch at St. Leonard's-on-Solent.

SH. 43. Weedy ditches near sea, possibly brackish, at St. Leonard's-on-Solent. The last two habitats are in a locality previously studied by Walton (see SH. 14-17, Pearce and Walton, 1939).

SH. 44. Pool on Longcross Plain. Circular depression on a heath. About 25 yards diameter, about 6 inches deep at edges. Vegetation *Callitriche*, *Glyceria*, *Myriophyllum*, some *Potamogeton*, a little *Juncus*. No emergent vegetation, but submerged grass in places. Dytiscid larvae, some beetles. Bottom gravelly with clay. No shade. Alt. 400 feet.

SH. 45. Streamlet beside track leading from Splash Bridge to Hasley Enclosure, New Forest. Shallow, not more than 3 inches, and not above 1 foot 6 inches wide. Vegetation *Juncus* and submerged grasses and heather. Bottom peat. No shade.

HERTFORDSHIRE.

HT. 3. A small woodland pond, about 30 yards in diameter, near Hertford Heath. Very shallow, being in an advanced state and nearly filled with dead leaves and decaying organic matter; much overhung by oak trees. A considerable amount of submerged grass; *Elodea canadensis* present but in a moribund condition, *Ranunculus aquatilis*, *Juncus*, *Lemna minor* and *L. polyrhiza*; emergent vegetation containing water plantain and a thick growth of *Bidens cernua*. *Hydrobius fuscipes*, *Haliplus* sp., *Hyphydrus ovatus*, *Laccophilus minutus*, *Helophorus dorsalis*, *H. aquaticus*, *Hydroporus* spp.; larvae of Diptera (*Chaoborus*, *Dixa*, *Chironomus*); *Polycelis nigra*, *Hydracarina*, *Asellus*; larvae of Zygoptera. pH 5.8. Alt. 200-400 feet.

HT. 4. A pond near Hertford Heath, partly overhung by trees. About 30 × 18 yards, tapering at one end, and divided

into two parts in summer by a narrow channel. Bottom muddy, covered with debris; thick vegetation round the sides, including *Callitriche*, *Juncus*, and a large quantity of submerged moss. pH 7.1. Alt. 200-400 feet.

HT. 5. A small pond, 12 × 6 yards, and 1-2 feet deep, in an open field near Hertford Heath. Considerably fouled by cattle; the water is cloudy; dries up in summer occasionally. Bottom muddy. Not much vegetation, but there is a submerged grass overhang, and some *Ranunculus aquatilis*. *Hydrobius fuscipes*, *Helophorus* spp., *Acilius sulcatus*, *Haliplus* larvae, larvae of *Chaoborus*, *Chironomus*, Culicidae and larvae of Zygoptera; smooth newts. Contains iron, the dragonfly larvae and other animals being of a rusty colour. pH 6.8. Alt. 200-400 feet.

HT. 6. A small pond resembling HT. 5, in a field near Hertford Heath; rather deeper, and more thickly vegetated with *Ranunculus aquatilis*, and a little *Lemna minor*. *Hydrobius fuscipes*, *Acilius* larvae, caddis larvae, larvae of mayflies and *Chaoborus*; frog spawn and newts. A drinking place for cattle, but not badly fouled. pH 7.2. Alt. 200-400 feet.

HT. 7. A pond in Golding's Wood, near Hertford Heath. Made artificially about 1937 by digging, and damming up a stream with a concrete wall; subsequently drained through a flaw in the dam; has since contained but little water in a puddle a few feet across and a few inches deep. Thickly vegetated with *Ranunculus aquatilis*, rushes and *Spirogyra*. *Agabus bipustulatus*, and other Dytiscidae and their larvae, *Hydrobius fuscipes*, larvae of *Libellula depressa*; *Gammarus*, tadpoles, smooth newts. pH 7. Alt. 200-400 feet.

HT. 8. A large woodland pond in Broxbourne Woods, about 50 × 30 yards, fairly deep, but with shallow sides. Much overhung by trees; bottom covered with dead leaves and debris; not much vegetation, except a little *Potamogeton natans*, *Lemna trisulca*, green algae and a few rushes. Larvae of Diptera (*Chaoborus*, *Chironomus*, Dixidae and Culicidae), larvae of mayflies and Zygoptera; *Asellus*, frog-spawn. pH 7.1. Alt. 200-400 feet.

HT. 9. A stream near Hertford; trickling water for the most part, but with a deeper, more slowly running part just below a small bridge, where the Hemiptera were mostly found. About 3-5 feet wide; bottom of pebbles, with finer silt in the more slowly running stretches. Larvae of *Simulium ornatum* and small Chironomidae; beetles in the calmer stretches, including *Ilybius fuliginosus*, *Colymbetes fuscus* and *Agabus bipustulatus*. pH 7.4. Alt. 200-400 feet.

HT. 10. A sunken brick pool in a vegetable garden at Haileybury College, three yards square, and containing water to a depth of about 2 feet 6 inches. Bottom covered by a little mud and decaying organic matter. No macroscopic vegetation. Beetles usually present, including *Colymbetes fuscus*, *Agabus bipustulatus*, *Acilius sulcatus*, *Ilybius fuliginosus*, *Gyrinus substriatus*; larvae of Culicidae, *Chaoborus* and larvae of mayflies; smooth newts. pH 7.5. Alt. 200-400 feet.

HT. 11. Pond by the Hertford-Hoddesdon road, near Jenningsbury. Dimensions 40 × 15 yards, depth about two feet. Surrounded by a ring of trees which shed leaves on to its muddy bottom. A considerable growth of *Spirogyra*, but no macroscopic vegetation besides. *Hydrobius fuscipes*, *Agabus nebulosus*, larvae of *Cloeon*, *Chaoborus*; Poduridae. pH 8. Alt. 200-400 feet.

HT. 12. The moat round Jenningsbury, one mile south of Hertford. A large moat round a big house and its grounds, some 15-20 yards wide, discontinued at one point where a road runs across it. pH 8.4. Alt. 200-400 feet.

Locus 1. A stretch about 20 yards long on one side of the road; with a bottom of black mud and devoid of vegetation save for a trace of green alga. Larvae of *Chironomus*, *Acilius* and other Dytiscidae; *Ptychoptera* (one pupa); fouled by cattle.

Locus 2. The rest of the moat; shaded by trees, and with a bottom of mud and a very thick growth of an unidentified alga with thick filaments; *Asellus* abundant, and water-fleas common.

HT. 13. Three or four pools in a disused gravel pit near Hoddesdon; about one foot deep. Bottom of mud and debris; *Lemna*, but little other vegetation. Larvae of Dytiscidae and of Zygoptera; *Gyrinus*; newt tadpoles. pH 8.3. Alt. 200-400 feet.

HT. 14. A series of pools, mostly interconnected, in sandy gravel pits one mile south-west of Cole Green (near Hertford). Bottom of black mud, with a little sand on the top. A certain amount of weed, differing in quality in the two loci. Depth from a few inches to about one foot when studied on August 4th, though on a previous occasion the water had been much deeper and more extensive. Alt. 200-400 feet.

Locus 1. On north-west side of Hertford-Hatfield road. Weeds containing *Chara* beds, *Typha*, *Potamogeton natans*, and water plantain. Beetles present, *Colymbetes fuscus*, *Ilybius fuliginosus*, *I. fenestratus*, *Agabus nebulosus*, *Hygrobia tarda*; dragonflies (*Sympetrum striolatum* common in larval and adult stage, and adults of *Anax imperator*, *Ischnura elegans*); newt tadpoles. pH 7.3.

Locus 2. On the south-east side of the road. Plants including *Potamogeton crispus*, *Juncus* and green algae. *Agabus nebulosus*, *Hygrotus inaequalis*, *Bidessus geminus*; newt tadpoles.

HT. 15. The River Lea. For the most part a slow-flowing river, with a certain amount of marginal vegetation. Alt. under 200 feet.

Locus 1. About half-way between Hoddesdon and Rye House; about 25 yards across, with sides from six inches to a foot in depth. Bottom of black mud, becoming gravelly in parts. Fairly thick marginal vegetation, including *Sparganium*, *Nuphar luteum*, *Ceratophyllum*, *Potamogeton natans*, *P. crispus* and *P. lucens*. *Limnaea stagnalis* and *L. auricularia*, *Planorbis* spp.; mayfly larvae, *Haliplus* spp., *Platambus maculatus*, *Helmis aenea*.

Locus 2. Below the weir just east of Hoddesdon. Deep, with little cover except submerged moss and crevices on wooden posts and the stone wall supporting the bank; current fairly rapid. *Brychius elevatus*, *Platambus maculatus*, *Helmis aenea* and *Orectochilus villosus*; puparia of *Limnophora* sp.; miller's thumbs.

Locus 3. One mile south-west of Hertford. About 20 yards wide; bottom gravelly; shallow sides; current faster than at Locus 1. Vegetation lacking except for a few submerged plants in one spot and a grass overhang. Larvae of *Ephemera* and other mayflies; puparia of *Limnophora*; *Haliplus lineaticollis* abundant; *Brychius elevatus*, *Helmis aenea*; *Gammarus*; *Theodoxus fluviatilis*.

Huntingdonshire.

HU. 1. A pond in Stilton Fen, south of Peterborough; 14 × 9 yards, 3-4 feet deep in the middle, shallow on one side. Bottom of yellow mud, slightly gravelly. Vegetation scanty—a few rushes and a grass overhang. A drinking place for cattle, but not soiled much. Alt. under 200 feet.

HU. 2. A stream between Peterborough and Yaxley; about 6 feet wide, depth from a few inches to one foot; current fairly rapid. Bottom of thick yellow mud, very soft in parts, becoming gravelly in others. Weeds in clumps, and a little submerged grass. Alt. under 200 feet.

Inverness, East.

EI. 1. Sandy banks of rivers at Inverness.

EI. 2. River Nethy; sandy banks.

EI. 3. Loch Garten. In Abernethy Forest; about $\frac{3}{4}$ mile long. pH 6.5. Alt. 726 feet.

Locus 1. Edge of loch.
Locus 2. Site of burnt-out cottage at margin.
Locus 3. Surface of water.
Locus 4. Weedy areas near sides of loch.
Locus 5. Open, clear water; bottom of light-coloured sand.

EI. 4. Loch Morlich. In Glenmore Forest; a large loch, about $1\frac{1}{4}$ miles long. Edge of loch worked. Alt. 1,046 feet.

EI. 5. Moors and cornfields at Aviemore.

EI. 6. Nethybridge; stony river bed.

EI. 7. River Spey.
Locus 1. Near Grantown; river bank.
Locus 2. Near Newtonmore.

EI. 8. Loch Insh, Kincraig; flood refuse.

EI. 9. Moorland bogs at Aviemore. Alt. 1,500 feet.

EI. 10. Grass tufts in bogs at Aviemore. Alt. 680 feet.

EI. 11. Peat-hags at Nethybridge. Alt. 700 feet.

EI. 12. Moorland bogs, Larig Ghru. Alt. just over 1,500 ft.

EI. 13. Stagnant backwaters, Larig Ghru.

EI. 14. Weedy lochan, Wester Tulloch, near Loch Garten.

EI. 15. Small loch, Nethybridge. Alt. 1,250 feet.

EI. 16. Loch Cruich. Sparse vegetation, bottom of peat. Alt. 1,250 feet.

EI. 17. Ryvoan, Nethybridge. Peaty water with sparse vegetation. Alt. 1,300 feet.

EI. 18. Ponds and small lochs, Aviemore.

EI. 19. Trickles at 1,200 feet, Cairngorms.

EI. 20. Loch Dhub, Aviemore. Alt. 1,000 feet.
Locus 1. Over peaty bottom, with sparse vegetation.
Locus 2. Small burn draining loch.

EI. 21. Small peaty loch, Larig Ghru. Alt. 1,250 feet.

EI. 22. Carn Dearg Mor, Aviemore. Peat bottom, sparse vegetation. Alt. 2,337 feet.

EI. 23. Peaty pools at Aviemore.

EI. 24. Weedy ponds and drains, Aviemore.

EI. 25. Weedy ponds and drains, Carr Bridge.

EI. 26. Small pond at Aviemore. *Carex*, *Potamogeton*, grasses. Alt. 700 feet.

EI. 27. Moss by hillside runnel, Aviemore.

EI. 28. Pool near footbridge, Cairn Gorm Club Bridge, near Aviemore. Alt. 1,000 feet.

KENT, EAST.

EK. 1. Banks of River Medway near Maidstone, from Snodland to Aylesford; tidal refuse and wet, marshy ground up to 100 yards from the river bank. *Lixius paraplecticus* L., *Bagous cylindrus* Pk., *Bembidion* spp., and numerous Staphylinidae.

KENT, WEST.

WK. 1. Banks of River Medway, near Maidstone; the same locality as EK. 1, but on the opposite side of the river.

NORFOLK, EAST.

EN. 1. Horning Fen.

EN. 2. An old ditch deep in the swamp south of the Staithe at Barton Broad. Water shallow over several feet of black mud. Banks of peat with overhanging *Carex pseudocyperus* and *Juncus effusus* and occasional alders and *Rubus*.

EN. 3. *Phragmites* swamp on Barton Common near Barton Broad. Reeds had been cut exposing shallow brownish water between the roots. Some *Juncus effusus*, *Menyanthes* and *Utricularia vulgaris*.

EN. 4. A narrow ditch on Barton Common running parallel to the north-west arm of Barton Broad. Sides swampy and vegetation thick; *Hydrocharis*, *Equisetum*, *Nymphaea*, *Elodea*, *Argyroneta aquatica* and many water beetles.

NORFOLK, WEST.

WN. 1. Pond on Cavenham Heath.

WN. 2. Ditch on Cavenham Heath.

WN. 3. Lang Mere, near Thetford.

NORTHAMPTONSHIRE.

NO. 1. A pond in Fengate, a suburb one mile west of Peterborough. Dimensions 20 × 15 yards, two feet deep in the middle. Bottom mainly of yellow gravel, with thick black mud beneath. Submerged grass, and floating vegetation covering most of the surface. *Hygrobia tarda*. Slightly soiled by cattle. A few trees round the pond. Alt. under 200 feet.

NO. 2. A pond in Flag Fen, 2½ miles from Peterborough. Dimensions 18 × 10 yards; shallow sides. Bottom of very sticky, soft yellow mud. Clumps of grass hanging into the water, and rushes. *Hygrobia tarda*; newts abundant (crested dominant, also smooth). Fouled by cattle. Water tinged yellow by the mud. Alt. under 200 feet.

NO. 3. Car Dyke in Gunthorpe district of Peterborough, one mile north of the city. Width varying from three to ten feet, and depth from a few inches to four feet. Water slow flowing and clear. Bottom of sticky, soft, yellow mud, and vegetation of thick reeds. Alt. under 200 feet.

NO. 4. A pond, 15 × 8 yards, and two feet deep, near Glinton, formed by the partial drying-up of a stream. Bottom mainly of black mud, with a few pebbles and larger stones. Weeds not very thick. Numerous eels and other fish. Soiled by cattle, and straddled by a brick bridge; bare of weeds. Alt. under 200 feet.

OXFORDSHIRE.

OX. 1. The River Cherwell.

Locus 1. At Somerton, where the river passes under a brick bridge carrying the road to North Aston; 12-15 yards wide, rather shallow, the current flowing fairly rapidly over a stony bottom. The stones were largely coated with a black slime, and a few green algae, submerged moss and *Ranunculus aquatilis* also present. A large variety of animals included:—Mayfly larvae, caddis larvae (including *Rhyacophila*), larvae of *Simulium* and Chironomidae, larvae of *Agrion splendens*, puparia of *Limnophora riparia* and Tipulidae; *Helmis aenea*, *Brychius elevatus*, *Deronectes elegans* (very abundant) and *D. duodecimpustulatus*, *Platambus maculatus*; *Gammarus*; *Theodoxus fluviatilis*, *Viviparus* sp., *Limnaea* sp., bivalves; blenny, three-spined sticklebacks. Water slightly cloudy. pH 7.5. Alt. 250 feet.

Locus 2. A half-mile stretch downstream of Locus 1. Stream deeper and sluggish. Vegetation including bulrush, *Typha*, *Sparganium ramosum*, *Phragmites*, and submerged plants with linear leaves, which harboured *Corixa striata*. *Gammarus* (very few), *Deronectes elegans*, *Haliplus* sp., *Platambus maculatus*, larvae of *Agrion splendens*; sticklebacks, *Cottus* and other small fish.

Locus 3. A stretch at Thrupp, resembling Locus 1 in general appearance, flora and fauna; shallower, and with greater growth of submerged moss and *Ranunculus aquatilis* on the stones. Alt. 225 feet.

Locus 4. At a point where a stone bridge crosses over the river at Lower Heyford. Resembling Locus 3, but wider and still shallower, being mainly of a nature approaching that of rapids. Less weed; fauna similar, with *Orectochilus villosus* and leeches (including *Glossiphonia*) in addition.

OX. 2. The canal at Somerton; 12-15 yards wide, about one foot deep at the sides. Bottom of mud. Vegetation includ-

ing a grass overhang, arrowhead, water plantain, *Potamogeton natans, Sparganium natans*. Fauna including *Haemopsis sanguisuga*, snails (mainly *Limnaea auricularia*, but *L. stagnalis*, *Viviparus*, and *Planorbis* also present); caddis larvae, larvae of *Agrion splendens* and other Zygoptera; *Laccophilus hyalinus*, *Haliplus* sp., *Helophorus* sp.; *Asellus*, *Gammarus*; three-spined sticklebacks and other fish. pH 7.5. Alt. 250 feet.

OX. 3. A small brick drinking trough at Somerton, three yards by 18 inches, six to eight inches deep. Cement lining, with most of the bottom covered with a thin layer of mud and debris. No vegetation. *Agabus bipustulatus*, larvae of *Chironomus*, and one frog. Alt. 400 feet.

OX. 4. The canal at Thrupp. A stretch 20-30 yards wide, with a muddy bottom, and thickly vegetated with arrowhead, *Elodea*, *Potamogeton natans*, *Sparganium*, *Myriophyllum*, white water-lily. Fauna including *Asellus*, leeches, Hydracarina, *Anodonta*, *Vivipara*, *Planorbis*, *Limnaea stagnalis* and other spp.; *Noterus capricornis*, *Laccophilus hyalinus*, *Hygrotus versicolor*, *Haliplus obliquus* and other spp., *Helophorus* sp. Alt. 250 feet.

OX. 5. The canal at Lower Heyford; 12-15 yards across, about one foot deep at sides. Bottom of mud, stony wall forming the bank. *Potamogeton natans*, *Sparganium natans*, arrowhead, grass overhang. *Limnaea stagnalis* and other spp., *Planorbis* spp., Hydracarina; *Hyphydrus ovatus*, *Laccophilus hyalinus*, *Haliplus* spp., dragonfly larvae. Sheltered by trees. Alt. 250 feet.

OX. 6. Ditches or drains in meadows between OX. 1, Locus 1 and OX. 2. Narrow, slow-flowing or stagnant; dry up in summer. Thick vegetation, coarse grass and sedges, green filimentous algae. Fauna including snails (especially *Planorbis*), *Asellus*, Dytiscid larvae, caddis larvae, Planarians, frog- and toad-spawn, *Helophorus aquaticus*, *H. viridicollis*. pH. 7.05. Alt. 250 feet.

PERTH, NORTH.

PN. 1. Loch Rannoch.
Locus 1. Edge of loch.
Locus 2. Wet shingle on banks of streams.

PN. 2. River Truim near Dalwhinnie.

PN. 3. Moorland bogs, Rannoch.

PN. 4. Loch Kinardochy, Rannoch. Pool with clear water, sparse vegetation and light sandy bottom. Alt. 1,250 feet.

Ross, West.

RW. 1. Loch Maree. Side of loch.

RW. 2. Bog-pool, Achnashellach.

Somerset, South.

SS. 1. Running stream at South Petherton; weedy.

Suffolk, West.

WS. 1. Heaths at Mildenhall.

Surrey.

SR. 4. *Sphagnum* at Wisley.

SR. 5. Ponds at Wisley; mud at margin.

SR. 6. The Basingstoke Canal; a stretch of half a mile north and south of Mitchett Lake, 1½ miles east of Farnborough; 15-25 yards across; water very low, with shallow sides. Bottom muddy, with a fair quantity of decaying organic matter, dead sticks and leaves from the trees which line the banks. Vegetation scanty, consisting of *Potamogeton natans* and *Polygonum amphibium*. *Asellus*, *Gammarus*; leeches; larvae of Zygoptera (including *Erythromma najas*); *Laccophilus hyalinus*, *Gyrinus* spp., *Haliplus* spp., *Ilybius fenestratus*, *Hyphydrus ovatus*. Alt. 250 feet.

Sussex, East.

EX. 1. Reed-bed at Camber.

EX. 2. A transitory pond near Brighton, about half a mile south-west of Stanmer. Dimensions 16 × 16 yards, shallow, especially at sides. Bottom of mud, with a few dead leaves and sticks. No vegetation, but a wealth of animal life, including *Tubifex*, *Chirocephalus*, water-fleas; larvae of *Chironomus*; *Hygrobia tarda*, *Agabus bipustulatus*, *Hydrobius fuscipes*, *Rantus pulverosus*. Cattle drink from the pond, and the water is slightly cloudy. Corixidae were especially abundant in this pond. pH 6.9. Alt. 300 feet.

Sussex, West.

WX. 1. A ditch round the airport at Shoreham, which widens out into ponds at one or two points; these ponds especially were studied. A variety of plants grew round the edges, including *Iris* and *Juncus*. Bottom of mud, covered with weeds and dead vegetation. Turbellaria, *Asellus*, *Gammarus*, snails; caddis larvae, *Hyphydrus ovatus*. Water very clear. pH 7.3. About sea-level.

WX. 2. Dew-pond near Chanctonbury Ring, near Steyning. Dimensions 20 × 20 yards; very shallow, especially round the edges. Bottom of stones and mud, with a few dead and decaying leaves. No vegetation; fauna including water-fleas (abundant), *Asellus*, *Hygrobia tarda*, larvae of Diptera. Cattle drink at the pond. Corixidae were very abundant, especially *C. lateralis*. pH 8.3. Alt. 750 feet.

WX. 3. Ditches in low-lying ground between Worthing and Goring; three to four feet wide, and up to nine inches deep. Bottom covered with dead and decaying leaves, grass and rushes. Green algae growing thickly in parts, and dead rushes emerging from the water. *Asellus* (very abundant), frog tadpoles, smooth newts, water-fleas, *Dendrocoelum*; *Hydrobius fuscipes*, *Helophorus aquaticus* and a variety of small Dytiscidae; larvae of *Chironomus* common locally, and Culicidae. About sea-level.

Wilts, South.

SW. 5. Roadside pond at Warminster; grass edges; bottom of clay or chalk.

SW. 6. Lowest ornamental lake in Longleat Park near Warminster. Beds of water lilies and *Myriophyllum*. Trees and sedges at sides. Many fish and waterfowl.

SW. 7. Third highest pool in Longleat Park near Warminster. *Myriophyllum* growing from stony bottom. Marginal alders, sedges and *Mimulus*.

SW. 8. Pool north of Witherington Down. On chalk. This is a dew-pond, and the level at the time of collecting was lower than usual; 15 feet diameter, eight inches deep. Vegetation submerged grass with *Rumex* emergent. Few mosquito larvae and beetles. Bottom chalky marl. No shade. Alt. 300 feet.

SECTION 5. NOTES ON ECOLOGY AND DISTRIBUTION OF SPECIES.

Gerris lacustris. The number of records indicate that this is by far the commonest species of the genus in the south and midlands, though this is by no means so in the north, or near the coast, as will be shown in a future publication.

Gerris argentatus. This species appears to be very local, and is so far unrecorded in Scotland; there is some indication that, like *Gerris asper*, it favours habitats with fairly thick emergent vegetation, though more evidence is necessary to make

a well-founded statement on its requirements; certainly there are other obscure limiting factors, as it is only found in a very small proportion of those habitats which are suitable to all outward appearances; perhaps, as indicated by Walton (1943, p. 259), surface tension will prove to be this limiting factor; this theory offers scope for experiment.

Gerris paludum. This species was quite common on the Basingstoke Canal (SR. 6); it was very difficult to catch since its eyesight appeared to have longer range than in the smaller species of the genus, and a few strides rapidly removed this rather striking insect out of reach to the centre of the canal. Only by waiting motionless on the bank until they returned towards the margin (which they would often do after a few minutes), could an occasional capture be made. Though to some extent localized on certain stretches of the canal, they did not exhibit the tendency to huddle into a close pack as *Gerris najas* usually does where it is common.

Mesovelia furcata. Normally occurs on still water. The River Lea (HT. 15) seemed, therefore, a very unusual type of locality for this species, although it was in emergent vegetation and the river flowed very slowly here. Only one specimen could be found—perhaps the offspring of a chance pregnant macropterous female which had migrated there, and one of the few which had managed to survive in a relatively unsuitable habitat. *Potamogeton natans* grew here, however, and some of the other habitats support Walton's contention (1939) that it favours water-bodies with floating leaves amongst the flora.

Hebrus pusillus and *H. ruficeps*. Judging by records I have seen so far, *Sphagnum* appears to be an essential complement to a habitat for *H. ruficeps*, though not necessarily for the other species (*vide* DT. 23 and SR. 5).

Salda littoralis. Mr. Harwood's records help to fill in gaps in the known Scottish distribution (EI and PN). This must be a widely distributed Scottish species, since it is the only Saldid recorded from Iceland, the Faeroes and Orkney, and *S. orthochila* is the only other species besides *littoralis* to have been found in Shetland. Either our knowledge of Saldid distribution is sadly insufficient, or else this family 'tails off' towards the north considerably more than do sub-aquatic species; this, however, would be understandable, since in hard weather sub-aquatic forms get a certain amount of protection from extremes of cold, which is denied to those species living on or above the water surface. It will be interesting to compare the northward extension in the distribution of other groups when we have a fuller knowledge of it.

Saldula scotica. All the records for this species in this paper are from Scotland, and its main distribution is undoubtedly more northern in Britain than that of *S. littoralis*; it is, therefore, curious that it is so far unrecorded from Orkney, Shetland, the Faeroes and Iceland, all of which have produced *S. littoralis*; this can hardly be due to lack of suitable habitats. The same may be said to a less extent of *Saldula c-album*.

Micracanthia marginalis. The interesting rediscovery of this species in Dorset is due to Mr. Harwood, who writes: 'It was in a tiny bit of dryish bog and the heather all round had recently been burnt.'

Chartoscirta elegantula. Though mainly littoral, it is not necessarily so, since it occurs at Wicken Fen (CB). Dr. Massee's observations on its occurrence in Kent are of interest; they have been put on record previously (1939, *Ent. mon. Mag.* **75**: 277), but he has supplied some additional information, and we cannot do better than quote *verbatim* from his letter:—'The *Salda* occurs along both banks of the Medway from Snodland to Aylesford, but seems to be more abundant at New Hythe, west of the paper mill. It occurs in the main in the tidal refuse, but it is by no means confined to this area, since it may be found sparingly in the refuse on the marshy ground up to a hundred yards away from the river bank. It seems to enjoy very wet marshy situations and does not occur in dry places. I have taken the adult each season in March, April and May, and again in August and September from 1939-1944, and by the very muddy appearance of those specimens found in early March the insect would appear to hibernate as an adult. I got one adult in flood refuse in January, 1944. The sexes seem to be about equal in numbers. Immature forms have been noted in June and July.

'*Salda elegantula* var. *flori* Dohrn. also occurs with the type. It is the form with the terminal joint of the antenna yellow. Curiously enough only the female form of the variety occurs, and this led me to suppose that all the females of the species were characterized by the yellow tips. This is not so, however, since the specimens in the B.M. with yellow tips are ♂♂.'

'In spite of prolonged searches over a number of seasons the macropterous form has not been noted.

'The *Salda* occurs in company with the following insects: *Salda cocksi* Curt., *Salda cincta* H.-S., *Salda saltatoria* L., *Salda pilosella* Thoms., and *Salda pallipes* Fabr., all sparingly. Also *Lixus paraplecticus* L., *Bagous cylindrus* Pk., *Bembidium* sp. and numerous Staphylinidae.'

The distribution of var. *flori* is worth a little examination at this point; according to Massee the Kent colony shows sexual dimorphism, the ♂♂ being typical, and the ♀♀ var. *flori*. According to Hutchinson (1926, p. 243), the same is the case at Wicken Fen, and at Hammersmith (specimens collected by Power); specimens from Poole Harbour, however, were *flori* in both sexes. Specimens of type form have been found in Durham and Glamorgan, and Hutchinson states therefore that 'the same sexual dimorphism probably occurs in these localities also'; this, however, is not necessarily the case, for two ♂♂ and two ♀♀ which I found recently in Dumfriesshire (details of the record will appear elsewhere) were *all* of the type form, although the terminal antennal segment of the ♀♀ was not quite so deep black as in the ♂♂.

From this evidence it appears possible that the type form may be the one existing in the north, and that var. *flori* becomes progressively more predominant towards the south, affecting the ♀ first, and finally, as at Poole Harbour, both sexes (it must be admitted, however, that Kent, where sexual dimorphism is the state of affairs, is almost as far south as Poole). It will be of interest to see whether this provisional theory will be supported by further evidence; Hutchinson (1926) states that there appear to be two races in Britain 'which may possibly have entered by two different routes'; presumably he meant a monomorphic race, *flori*, from the south, and a dimorphic one from the north; but, in view of the Dumfriesshire specimens mentioned above, the two 'extreme' races would each be monomorphic, the northern one typical, the southern one *flori*, and where their ranges have spread and overlapped, interbreeding must be supposed to have occurred with the production of a dimorphic population, the ♀ retaining the facies of the southern, and the ♂ that of the northern race. Though such a condition would not be genetically impossible, its extreme unlikelihood detracts from the value of Hutchinson's theory of a double entry-route. Is it not more probable that the character is the result of the interaction beween a genetical factor and an environmental one, the latter having possibly a north to south gradation in intensity, and affecting the ♀ more readily than the ♂? It is pointed out that these conjectures are made on hitherto very slender evidence; it would be helpful if any collectors with a series of this species, or opportunity to collect one, would examine them for this character and report on their finding, in the hope that more precise knowledge of their distribution will throw more light on the relation between these forms. It will be profitable, therefore, if the facts which I have so far ascertained be illustrated in a table (see Table 1).

Locality (reading north to south)	♂ form	♀ form
Dumfries	typical	typical
Durham	At least some forms typical—	
Glamorgan	sex unspecified.	
Wicken Fen (Cambridge)	typical	var. *flori*
Hammersmith (Middlesex)	typical	var. *flori*
Kent	typical	var. *flori*
Poole (Dorset)	var. *flori*	var. *flori*

Table 1. Distribution of typical form of *Chartoscirta elegantula* and of var. *flori*.

Aphelocheirus montandoni. The discovery of this species by Pearce in Flint and Denbigh is of interest, in view of the writer's failure to find it in Caernarvon (Brown, 1943); this, and its recent discovery in Cardiganshire (Jones, 1943), show that it may have a more extensive distribution in the river-systems of the west than has hitherto been thought; and it is worth while calling attention here to its recent discovery just north of the border in Scotland (Limbert and Slack, 1939), indicating a more northerly extension of its range than formerly known. It is clear that we do not know enough about its range yet to correlate it with prehistoric river-systems; its distribution is of considerable interest, since in view of its probable inability to migrate owing to its wingless condition, this distribution no doubt represents a ' primitive ' one, unmodified by recent extension.

Since it is desirable to know more about its range, it may be worth while to give an account of the best way to obtain it; it occurs usually in rivers, in water with moderately (not excessively) fast rate of flow, among loose stones with a certain amount of moss or other vegetation on them, and muddy silt in between; if the stones are stirred up with the foot and the net is worked vigorously amongst the silt which arises on the downstream side (before it has time to be carried away by the flow), the collector has a fair chance of capturing any *Aphelocheirus* which may be present. It should also be borne in mind that the species has been found along the stony shores of lakes (*e.g.* Bassenthwaite), though this can hardly be regarded as the normal habitat.

Ilyocoris cimicoides. Apart from the single Scottish record for Lanark (Murphy, 1901), the furthest north records of which I know are for Nottinghamshire and Lincolnshire, leaving a large gap in which either it does not exist or is as yet undis-

covered (I suspect the former, as recent search in south Scotland has not revealed it). This is a curious distribution, recalling the recent discovery in the Hebrides of *Cymatia coleoptrata* and *Micronecta minutissima*, hitherto known only from the south. It would be interesting to know whether these examples of discontinuous distribution are fortuitous, or whether similar instances occur in other groups and the discontinuity has some significance.

Nepa cinerea. Of twelve habitats in which there is any record of the nature of the bottom, ten have muddy ones, and a general impression from my own collecting is in agreement with this. It is not unlikely that the reason is that the presence of mud aids the general anticrypsis, on which *Nepa* must rely while lying in wait for its prey: it is frequently to be seen half-buried in a muddy floor under shallow water; Butler indicates a similar view (1923, p. 547).

Ranatra linearis. Three of the six localities producing it were thickly vegetated, and two of the others contained weeds to a lesser extent; we have no details of the remaining one. There is little doubt that *Ranatra* favours thick vegetation to a much greater degree than does *Nepa*, and this gives it the better advantage of its protective resemblance to a stick or plant-stem; amongst weeds it is more difficult to detect than *Nepa* is.

The northern limit of *Ranatra's* range is not well established. There are isolated records for Yorkshire and Flint (the latter is quoted by Saunders but not repeated by Butler, who states that the only Welsh record is for Glamorgan); south of these the most northerly records are on a line from Norfolk to Worcester, so that there is a considerable gap in the known distribution.

Plea leachi. There is a 'gap' in the range of this species similar to that in the range of *Ranatra*, though *Plea* extends further north to Northumberland, into Ireland, and is more widespread in Wales. Are these 'gaps' real, or do they merely represent discontinuity in the distribution of collectors? The latter is the more likely, but evidence to corroborate this suspicion would be welcome.

Its occurrence in brackish water (NE. 7) is of interest, as apart from Walton's evidence (1943, p. 347) of abundance in 'semi-brackish ponds,' I do not know of any other record of such a tendency in this species; it appears to be one of those species which can flourish equally in brackish and fresh water, like *Arctocorisa blackburni* (White) in Hawaii, and to a less extent in this country *Notonecta viridis*, *Corixa affinis*, *Corixa concinna* and perhaps, to a less extent still, *C. panzeri*, *C. striata*

and *C. fossarum* (Walton, loc. cit., p. 254). The question arises whether these bugs have certain physiological features which enable them to exist in both fresh and saline water, or whether their presence in both is controlled by an intermediate factor, such as the ability of an important item in their food to exist in varying salinities. Certain water-beetles, typically dwellers in fresh water, also seem better capable than others of maintaining an existence in brackish water when necessary; such are *Noterus capricornis* Hbst., *Hygrotus inaequalis* F., and certain *Helophorus* spp.; while *Octhebius lejolisii* habitually changes from fresh to salt and back again without apparent embarrassment.

Notonecta. The records of *N. obliqua* from RW and EI extend its known range in Scotland. On present evidence it appears that of our four British species in this genus, *N. glauca* and *N. obliqua* are the most similar to one another both in the great extent of their range in Britain and in their choice of habitat, which is generally rather thickly vegetated and seldom, if ever, brackish; *N. maculata* and *N. viridis* are restricted to the south in their range (the latter apparently more so than the former), and differ in their choice of habitat, both from one another and from the other two species. This is of some interest, since *glauca* and *obliqua* are, according to Poisson (1933), the most closely related structurally of European species of *Notonecta*, and in fact in the Mediterranean region intergrade and interbreed. If they represent two incipient species produced by dichotomy of one, then it is clear that it is not geographical, and probably not ecological isolation which has made this impossible; it is true, however, that although the two species may live together in Britain and in most parts of the Continent, they more often breed in separate habitats, and there may be some form of ecological or physiological isolation which we do not know about.

It has been thought hitherto that *N. viridis* is a coastal, or even a brackish water species; the records from BD, BX, CB, HT and NO, however, indicate an extensive inland distribution in the south. It is possible it may be spreading inland, but more likely it has been overlooked in the past owing to confusion with *N. glauca*.

Corixa punctata. Of ten localities of which there is a record of the pH value, eight are alkaline (pH=7.1-8.4), and the other two are scarcely on the acid side of neutrality (pH=7.0 and 6.9).

Corixa dentipes. Records for three new vice-counties (EI, WN and NO) extend the rapidly increasing known range of this species, making it appear probable that its British range will eventually prove to be very wide; in fact, it is now already

known from England, Wales, Scotland (including the Outer Hebrides) and Ireland.

Corixa striata is recorded from eleven slow-running streams and ditches, and seventeen standing-water habitats; this, however, is not representative of its tendencies, since in many of the latter it was found singly; it was common or dominant in only two or three standing-water habitats, but in no less than six of the running-water ones; further, four of the standing-water localities are canals, which have much in common with running water owing to frequent movement through the action of locks. The evidence, then, points to slow-running water being the more usual choice of this Corixid in the areas worked; the records are predominantly southern, and this does not mean to say that the same is the case in the north. Of ten localities where the pH is recorded, all were alkaline except one, but this is hardly in itself significant, since only in one of these was the species at all common; there is no pH record for the other localities where it was well represented. Since, in southern waters, movement and alkalinity often go hand in hand, the attraction to running water may be merely secondary, the alkalinity being of more fundamental significance.

Corixa venusta. Three habitats out of the five are still water (EI. 20, EI. 28, PN. 4); all three are at high altitudes (1,000 feet or over) in Scotland, and this change from running to still water with increased altitude is in agreement with what is frequently found in this species: EI. 19, however, though at 1,250 feet, is a running-water habitat.

It is remarkable that in the distribution of this species as known at present there is a large gap in central England, it being largely confined to the coastal counties, whereas in Scotland it occurs freely inland. While it is probable that this is largely just another instance of incomplete observation, the species is certainly very scarce or local in HT, for I have failed to find it there after fairly extensive collecting; it will no doubt prove to be mainly a northern and western species, like *C. castanea* and *C. scotti*.

Corixa limitata. So far as I am aware the record for the Hebrides (Heslop-Harrison, 1937) is the only previous Scottish record; Harwood's record for the north Scottish mainland (EL. 3) is therefore somewhat surprising, and indicates that the species may be thinly scattered over a wide range; it has incidentally been recorded from Ireland since Butler's day.

All habitats from which *limitata* is here recorded are still water, nearly all ponds, with muddy bottom, a variable amount of vegetation, and probably all alkaline, though there are not data for a sufficient number for this to be certain.

Corixa lateralis and *C. nigrolineata*. These two species are best treated together since, although in many cases they appear to favour similar waters, there are differences, the study of which profits by comparative treatment. They are sometimes, but not always, common in the same habitat (*e.g.* BX. 1, CB. 17 and EX. 2). Of nine localities where *lateralis* was common or dominant, seven were still water, and two had a slight flow through (but in one of the latter it was outnumbered by *nigrolineata*); no less than seven had evidence of fouling by cattle. Of ten localities (in some instances the same ones) where *nigrolineata* was well represented, five were still water and five running, and only four bore evidence of animal fouling. Thus, though the two species have doubtless certain common tendencies, they also have individual preferences; *lateralis* favouring stagnant conditions and animal fouling, and *nigrolineata*, though not averse to animal fouling, finds also an attraction which may or may not be connected with running water. That this is not the whole story is shown by the surprising comparison between the two ponds EX. 2 and WX. 2, which to all outward appearances are of similar type; yet the numbers of the two species taken in a good sample from the two were as follows:—

	C. lateralis	*C. nigrolineata*
EX. 2 (15/5/40)	22♂♂, 42♀♀	15♂♂, 24♀♀
WX. 2 (14/5/40)	64♂♂, 25♀♀	1♂

The only differences between the two ponds are that EX. 2 sometimes dries up (it is a favoured haunt of the Crustacean *Chirocephalus*), while WX. 2, being a dew-pond, seldom if ever does; and that WX. 2 is at a higher altitude, which one would have thought, from evidence elsewhere, would have favoured *nigrolineata* instead of suppressing it. The reversed sex-ratios in *C. lateralis* in the two ponds are remarkable. An interesting line of research into the requirements of these (and other) species would be to find out if oxygen-tension has any bearing, though it is unlikely that there was much difference as regards this factor in the two ponds mentioned above.

As regards pH, both the *lateralis* and the *nigrolineata* habitats were more or less strongly alkaline; the fact that *lateralis* was abundant in EX. 2 (pH=6.9), however, suggests that the alkalinity may be only incidental or of secondary connection, and in *nigrolineata* this is almost certainly the case, since in addition to cattle-ponds it also thrives in strongly acid peat-pools in mountainous districts.

Corixa concinna. Judging by the manner in which this species turns up in ones and twos amongst strong populations of other species (see Brown, 1943, as well as present records), it appears to be strongly migratory.

C. linnei. Of the twenty-four water-bodies from which it is recorded, nineteen are stagnant; of the five where it was common, four were stagnant, the fifth being a large drain in Wicken Fen (GB. 18) with emergent vegetation, where stagnant conditions probably obtained locally. The amount of vegetation does not seem to be important, however (*e.g.*, NO. 2), and the nature of the bottom, muddy and often with much detritus, is probably a weightier factor. The pH value is not recorded for any locality where it was common, but was round about the neutral point in four out of five waters where it occurred sparingly, and strongly alkaline in the fifth.

It has been known from a few widespread localities in Scotland before, including the Hebrides (Walton, 1942), the Glasgow area (Murphy, 1901), and Elgin (Norman, 1877), and Harwood's discovery in Inverness does not therefore constitute an extension of its gross range. It appears to be a species which maintains itself sparingly over a wide area.

Corixa moesta and *C. castanea.* These two species overlap in their range to a greater extent than seemed likely when it was first discovered that both existed in the British Isles. In England, Wales and Scotland *castanea* still appears predominantly western and northern, and *moesta* eastern and southern; but both exist in Wales, Somerset, Hants, Surrey and Sussex, and presumably in at least some of the intervening area. *C. moesta* has not yet been found north of Derbyshire and Caernarvon.* In Ireland, however, the records available at present indicate that the two species are both widely distributed and coextensive, for both occur in the north, south-west and east (Halbert, 1935). It is curious that *moesta* should be restricted further south in England than it is in Ireland; perhaps we do not yet know enough about their distribution, and *moesta* really occurs further north in England than is recognized at present.

Reference to Section 3 does not reveal the two species appearing in the same habitat, and this is in accordance with other experience so far; it would be interesting to know if they ever breed together in Ireland, where their ranges overlap more. Of four localities for *moesta* where the pH is known, the values are 5.8, 7.0, 7.4 and 7.3, showing a wide range of tolerance with perhaps a bias towards the alkaline; *castanea* often breeds in far more strongly acid water, but whether this is incidental or fundamental is not yet known.

Corixa fossarum and *C. scotti. C. fossarum* is here recorded from nineteen localities, and *scotti* from only six, and in none

* Since this was written, records have appeared from as far north as Yorkshire (J. M. Brown, 1947, *Naturalist*: 108-110) and even Westmorland (E. C. Bedwell, 1945, *Ent mon. Mag.* **81**: 253-273).

of these were both species found together. Of the total twenty-five localities, only four had running water, and these all produced *fossarum* but not *scotti*. pH measurements are available only for five of the *fossarum*-habitats, which vary from 6.8 (SE. 1) to 8.4 (HT. 12), and one of the *scotti*-habitats, which is 6.5 (EI. 3); two of the Inverness localities for *scotti*, however, are described as 'moorland bogs' (EI. 12, where it abounds), and 'bog-pool' (RW. 2), which are almost certainly acid. It thus appears that *scotti* has a bias towards acid and standing water, and *fossarum* towards alkaline water, without aversion to a certain amount of flow. The latter species also shows a predilection for a clay bottom (BD. 1, DT. 24, NO. 1, NO. 2, NO. 3), which is more likely to exist under alkaline than under acid water.

The greater number of records for *fossarum* than for *scotti* in Section 3 is due to the fact that these records represent more extensive collecting in the south and south-east than in the west and north; for *scotti* is much commoner in the west (Brown, 1943) and in northern Scotland; Harwood states that it is 'common everywhere' in EI; he does not mention *fossarum*, which is therefore presumably uncommon there, though it does actually exist in the north of Scotland, and has been recorded from EI.

Corixa falleni and *C. distincta*. These two species are here recorded from seventeen and fifteen habitats respectively. Of the seventeen producing *falleni*, seven were running water and ten still water, but two of the latter were canals, which have something in common with running water as stated before; *all* the localities where *distincta* was found were still water. pH values for seven of the *falleni* localities are available; all are alkaline except two (HT. 5, where only one specimen was taken, and EX. 2, where it was fairly common, but much less so than other species, and it probably does not breed there). The only known pH values for *distincta*-habitats are 8.4 (HT. 12), which is not representative for this species, and the habitat only produced odd specimens, and 6.5 (EI. 3). It thus appears that *falleni*, unlike *distincta*, may often favour running water; but since, like *fossarum*, it also occurs in still water, it is likely that the running water factor is a secondary one, and that the alkalinity often concomitant with it may be more important.

C. distincta is much more northern than *falleni*. Harwood states *distincta* is 'very common in Aviemore district' (EI), but does not record *falleni* from the north; the latter has been recorded as far north as Perthshire, but is apparently not common in Scotland.

The relation of *falleni* to *distincta* is thus similar to that of

fossarum to *scotti*, and possibly of *moesta* to *castanea*, although *distincta* extends into the south-east of England in greater force than either *scotti* or *castanea*. We may therefore represent the relations between these three pairs of closely-related species in a tabulated form (Table 2). As far as the distribution is concerned, we must not lose sight of the fact that all six species

Points of comparison \ Closely-related pairs of species	*C. moesta* / *C. fossarum* / *C. falleni*	*C. castanea* / *C. scotti* / *C. distincta*
Tendency to occur in alkaline water	+	
Tendency to occur in acid water		+
Of frequent occurrence in running water	+ (except possibly *moesta*)	
Seldom found in running water		+
Main Britannic distribution southern and south-eastern	+	
Main Britannic distribution western and northern		+

Table 2. Ecological and distributional relationship between *Corixa moesta, fossarum* and *falleni* on the one hand, and *Corixa castanea*, *scotti* and *distincta* on the other.

are found all over Ireland (Halbert, 1935); but what is of more importance than mere presence or absence is the numerical relationship of the species in different districts, and as far as we know at present this indicates a distribution as shown in the table for England, Wales and Scotland, and may eventually prove to represent the condition in Ireland also.

Corixa carinata and *C. germari*. Records of these two species are especially welcome, since they were formerly confused as one species and the records are mixed. All the records in this paper are Scottish, where both species are probably widespread; all are at altitudes of 1,000 feet or over, one of the localities for *carinata* (EI. 22) being as high as 2,337 feet. While altitude is probably important for *carinata,* it is evidently less

so for *germari*, for this species occurs in the south of England where such land-altitudes do not exist. In this connection, Butler (1923) records *carinata* also for the south (Surrey and Hants); these records must be regarded as doubtful unless confirmed; they probably refer to *germari*; the southern limit in Britain for *carinata* is not at present well known, but it is extremely doubtful if it reaches the south coast unless it be in the west.

Corixa wollastoni. The only records subscribed to this paper are from EI, and all are for localities at 1,000 feet or over. Walton (1942, p. 428) states: 'In Scotland the few available records indicate that there it occurs down to sea-level': this is not borne out by the present records; in view of its occurrence, with *C. carinata*, down to sea-level in the Faeroe Islands (Brown, 1945), and by analogy with such alpine species as the water-beetle *Deronectes griseostriatus* Deg. (the lower altitudinal limit for which descends towards the north), one would certainly expect *C. wollastoni* to thrive at lower and lower levels as we proceed further north in Scotland; but there are not yet enough data to state whether this is so.

Cymatia coleoptrata and *C. bonsdorffi*. The records agree with previous ones in showing *coleoptrata* to be more or less confined to the south and east, except for an isolated record from the Hebrides (Walton, 1942); *bonsdorffi*, while also existing in the south and east, extends into Scotland (here recorded from EI and PN); we have here a distributional relationship reminiscent of that between the pairs of species shown in Table 2, but there is insufficient evidence to show whether ecological requirements throw the same light on distribution as in those species.

Walton has succeeded again in finding the macropterous form of *bonsdorffi* (EN. 2); two out of a total of six indicates that there may have been a high percentage of developed forms in this locality.

Micronecta. Harwood's specimens of *minutissima* have already been referred to by Walton (1938): details of the habitat are unknown.

M. poweri is here recorded from five localities; four of them are running-water habitats, as is usual for this species at low altitudes. It is to be noted that in HT. 15 small numbers of nymphs occurred amongst the adults in August; Walton (1943, p. 249) states that adults occur from May to October, and that third-instar nymphs then take their place; but evidently a few must start breeding earlier, since it is unlikely that nymphs in August have remained from the previous winter without matur-

ing; no doubt a certain amount of breeding occurs throughout the summer.

M. scholtzi is recorded from three localities, all of them still water with more or less lacustrine conditions.

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